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OCULAR MANIFESTATIONS OF MALNUTRITION IN RELEASED PRISONERS OF WAR FROM THAILAND

BY

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OPPORTUNITY has presented itself for the examination of the eyes of some 500 released allied prisoners of War and internees from Thailand who considered that there sight had deteriorated during captivity. Among these no less than 100 cases of amblyopia have been seen in 17 days, and many of those whose corrected vision is normal have subclinical vascular lesions of the eyes. The majority of these men are to be repatriated immediately and many will shortly be attending the ophthalmic clinics of the United Kingdom. In Rangoon it has been possible to examine large numbers who have as yet had no opportunity to improve, and the findings are a guide to the prominent features of syndrome which may be less evident by the time the men reach home.

The barbarity with which these men were treated caused the death of thousands from malnutrition and intercurrent disease. For the purpose of this report it is sufficient to record that the food was inadequate in quantity, especially in view of the heavy labour which had to be performed and that it was lacking in variety, being especially deficient in protein, fats and vitamins. Red Cross parcels were hardly ever distributed and drugs for the treatment of severe

illness were in short supply. The three daily meals were the same and consisted almost entirely of carbohydrates, chiefly rice usually polished but of poor quality and containing much grit. This was supplemented by vegetable stew containing pumpkin, yam, sweet potato, bringal, Chinese radish and Chinese cabbage. Generally the food was boiled but sometimes a rice rissole fried in cocoanut oil which contains little vitamin A was available. The meat ration was variable though always small, and poor quality tea was supplied. Sometimes at base camps it was possible to purchase eggs and bananas. From October, 1942, to March, 1943, nearly everyone, even the sick, was forced to labour from dawn to dusk on building the Bangkok-Moulmein railway. The food was reduced to starvation level and for a time only rice and salt were supplied. It is not surprising that most visual disorders originated during or shortly after this period.

Among the 100 amblyopic patients visual failure occurred in 90 between October, 1942, and December, 1943, so that the sight has now been defective for two-and-half to three years. Acuity with correction varied between 1/60 and a partial 6/6, 9 read less than 6/60 with the better eye, 16, 6/60, 26, 6/36, 15, 6/24, 15, 6/18, 7, 6/12, 8, 6/9 and 4, 6/6. All those with scotomata and good acuity reported recovery from temporary severe amblyopia. In many cases the onset was sudden, maximum disability was reached within a single day, though in others it was gradual, taking months to develop. The first symptom was usually inability to recognise the faces of friends unless they were close, and those who had access to books found that they could not read. Some men were punished for failing to see the signals of their guards. One man described his defect as resembling that which follows prolonged gazing at an electric light. There was some degree of photophobia and sight was particularly defective in bright light. Rather surprisingly there were few complaints of hemeralopia, "we could see quite well by starlight" was the usual story, though some officers otherwise normal said that for a time they had difficulty in finding their way about at night.* Intercurrent infections tended to precipitate amblyopia, though in a number of cases this had an inverse effect, for patients removed to hospital received better food, including eggs. Many patients with amblyopia said that in addition to recurrent attacks of the common tropical infections they had suffered from pellagra, oedema of the legs, dry beri-beri, and from such minor lesions as sore tongue and perleche which usually accompany deficiency in the B group of vitamins. Quite a high proportion of the amblyopic have become nerve deaf, though other neurological disorders have so far seldom been found.

* Wing Commander A. G. Cross, R.A.F.V.R. has kindly examined amblyopic patients with the hexagon night vision apparatus and finds them all grossly defective. It is probable that this test is too stringent for clinical guidance in these cases.

On examination the presence of a scotoma is suggested by slight movements of the head when the patient attemps to discern a distant object, and by corresponding movements of the print when reading. In those with greatly reduced sight the pupils are dilated in comparison with those of normal individuals in the same illumination. In the fundus there may be no visible abnormalities even when the amblyopia is of long standing, though in many of the severe cases there is definite pathological pallor of the temporal half of the disc, the colour becoming grey rather than pure white. There were 48 cases of optic atrophy and 30 more were regarded as doubtful, though in some instances of severe and prolonged amblyopia the appearance of the disc was normal. Except in three cases of pseudo-papilloedema associated with hypermetropia there was nothing suggestive of past oedema of the nerve head, the edges of the disc being sharp and the physiological cup normally developed. The retinal vessels are not constricted and the macular area and its surrounding vessels generally appear normal, though in a few instances where temporal pallor is marked there appears to be some reduction in the calibre of the macular arterioles, a change probably secondary to retinal atrophy.

Campimetry revealed in 90 cases a small sharply demarcated central scotoma rarely extending more than 3° and sometimes only 1° from fixation, and often only 1° or less, though within this area in severe cases even a 40 mm. white object was invisible at 1 metre. The edges of the scotoma are abrupt, the isopters for large and small objects being almost identical; density of the scotoma rather than its size is the important variable. In the remaining 10 cases the core of the scotoma was para or pericentral and situated within the 3° circle, the fixation area showing less visual depression. In this type the affected area was usually more extensive and the peripheral margin especially was less abrupt and extended as far as the 5° circle. In four of these cases the scotoma appeared to be limited by the horizontal meridian on both sides of the fixation point. Some patients with this type of field say that some portion of a letter or some letters in a line are invisible and that objects tend to appear and disappear. In the majority of these cases there was a history of considerable improvement during captivity, which is in accordance with the shelving edge of the scotoma.

The charting of these fields is difficult, and to obtain fixation in the presence of a central scotoma the gaze is directed to the centre of a white ring 4 inches in diameter. Fixation of a negative point is difficult to achieve and it is found that patients rapidly fatigue and tend after a while from long practice to employ the paramacular retina. To minimise the effect of small movements and to increase the scale it was found advisable to place the screen 3 metres from the subject. The three worst cases could barely see the fixation

ring at this distance and allowing for somewhat wide individual variations, it was usual for a 40 mm. white object to be invisible at 3 metres when the acuity was less than 6/60, a 20 mm. corresponding to 6/60, 15 mm. to 6/36, 10 mm. to 6/24, 4 mm. to 6/18, while with higher degree of acuity the presence of even a 3 mm. white object might be appreciated though less clearly in the central than the paracentral area. With vision of 6/9 or better central fields were demonstrated by depression of the colour sense to a 10 mm. object. Peripheral fields were not charted but no defect was discovered by rough testing.

Practically all the released prisoners show some degree of kerato-conjunctival abnormality. There is no gross injection except occasionally in the interpalpebral area where the conjunctiva may be dull, thickened and opaque. No xerosis corneae or Bitot's spots have been seen and the only pterygium was of long standing. In 96 per cent. of the amblyopic and 91 per cent. of the other patients the fine capillary plexus at the limbus is increased in extent, and minute superficial vessels barely wide enough to pass corpuscles may extend as far as 2 mm. into the cornea. The vascularisation is accompanied by superficial opacification. Frequently the internal margins of capillary loops unite to form quite large circumferential vessels. The most striking feature of the limbal capillaries, however, is their variability in size which is often so great that aneurysms, both fusiform and saccular, appear. These are situated rather more frequently on the scleral than the corneal portion, and the larger ones are easily seen with the corneal loupe. They may at first be mistaken for haemorrhages, but under the high power of the slit-lamp (using 10× oculars in place of the usual 5×) blood cells can be clearly seen passing through the lumen, and sometimes where the circulation is sluggish the aneurysms alternately fill up and then discharge their blood. Aneurysms were present in 65 per cent. of the scotomatous patients and in 48 per cent. of those with normal sight. No haemorrhages have been observed. In 18 per cent. some degree of arcus senilis was seen in the lower portion of the cornea, the grey area being separated from the limbal opacity by a band of clear cornea. In three instances interstitial keratitis accompanied by iritis developed during captivity and in these the Kahn test was negative.

When correcting refractive errors it was interesting to note how readily small changes, especially those of cylinder axis were appreciated in spite of a central scotoma. It was also observed that all ex-prisoners were unduly presbyopic, though it may well be that accommodation will improve along with general condition.

There seems little doubt that the lesions described are due primarily to malnutrition, though there may be other factors since only a small proportion of men living under the identical conditions were

affected. No series of cases has occurred in the civilised world until this war. No literature is at present available in Rangoon, but so far as can be recollected, the greatest number previously reported was fifteen in Chinese individuals in Hong Kong by Wilkinson and King in 1944. Stannus has attributed amblyopia with optic atrophy to deficiency of vitamin B and Fitzgerald Moore (1937) came to the same conclusion from work in Central Africa. It was noted, however, that whereas sore tongue, perleche and skin lesions due to avitaminosis responded in a few weeks to the administration of yeast the amblyopia was very slow to improve, little change being appreciable for several months. Cod liver oil and fruit juice had no effect on controls. Wilkinson and King reported improvement in some of their cases on yeast and nicotinic acid. The present series of European cases while providing vastly superior material for detailed examination of the visual fields does not permit the employment of controls for therapeutic tests. There is no doubt that the diet was deficient generally, especially in proteins and fats as well as in vitamins, and in the absence of direct evidence that avitaminosis unsupported by other factors is the cause it seems advisable to attribute the lesions to general malnutrition rather than to simple deficiency of the B group. Enzer and his co-workers investigating the sensitivity of the optic nerve to organic arsenic in the absence of an adequate diet found that some of their control rats which had been deprived of either vitamin A or vitamin B developed optic atrophy. The abnormal vascularity of the limbus closely resembles that described by Sydenstricker as a result of ariboflavinosis, and improvement may be expected from treatment. It is thought that vascularisation is a reaction to deficient oxidation of the cornea due to shortage of vitamin B2. Interstitial keratitis similar to the three cases reported above was also attributed to the same cause. It should be mentioned, however, that a number of healthy soldiers who have been in a tropical climate for some time have some increase in the limbal plexus, and that West Africans who had definite signs of B deficiency did not show these changes. The incidence of arcus senilis in young men is perhaps little in excess of normal, but suggests a derangement of fat metabolism.

It is uncertain whether the disturbance in the visual pathway originates in the retina or the optic nerve; nor is the mechanism whereby the neurones are affected understood. In view of the known abnormality of the conjunctival capillaries it is tempting to postulate a vascular origin, failure of the choriocapillaris to nourish the outer layers at the macula or, if the limitation of some fields by the horizontal meridian has any significance, failure of the macular branches of the superior or inferior divisions of the central artery to nourish the inner layers of the retina. There is, however, at present no concrete evidence to support such a theory and no more than a

suggestion is justifiable pending microscopical or biochemical evidence.

Treatment of the amblyopic patients has been undertaken by Major R. H. Girdwood, R.A.M.C. In addition to a full European diet supplementary vitamins are administered. Each man receives ten tablets of "Multivite," a preparation containing thiamin 1 mg., riboflavine 1 mg., ascorbic acid 25 mg. and nicotinic acid amide 10 mg., together with aneurin 6 mgs. daily, and at the start parenteral vitamins in the form of 8 c.c. of crude liver intramuscularly for 6 days. Severe cases also receive parenteral riboflavine which is in short supply. Yeast is not locally obtainable.

Amblyopic patients are still arriving at the rate of about 5 per day, and it would be serious if 1 per cent., and may be more, of the survivors from Japanese prison camps are to be permanently disabled by defective sight. So far there has been insufficient time to assess improvement, though after a fortnight about half the patients consider that they can see better especially when trying to read. In some cases acuity has improved by as much as two lines of the test type and in several the density of the scotoma is reduced. Some men in the early stages recovered during captivity when better food was supplied and it is to be hoped that even at this late stage all will improve to some degree in the course of months, Presumably those with established optic atrophy are the least favourable. Arrangements have been made to follow up all the cases, British, Australian and Dutch, and it is hoped to publish a full report at a later date.

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OCULAR GNATHOSTOMIASIS*

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PARASITES in the human eye are rare. Onchocerca is responsible for cases of blindness in certain regions of Africa and America. Undoubted cases of filaria bancrofti, doubtful cases of filaria loa

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(F. oculi), and filaria medinensis have been described. *Cysticercus cellulosae, echinococcus,* the *lazia callipaeda* and larvae of flies have been reported. This is probably the first case of Gnathostoma in the human eye to be reported. Human infection with Gnathostoma is very rare. According to Maplestone and Bhaduri (1937) since the report of the first case of human infection in Siam in 1890, only 24 definite and 60 clinical cases were reported up to 1937. These cases were distributed as follows, 15 definite and 60 clinical cases from Siam, one from Malaya State, three from China, one from Japan and four from Bengal. The sites from which the worm had been recovered in the four cases recorded from Bengal were two from superficial abscesses in fingertips, one from a mastoid abscess and one from an abscess on the right side of the forehead. The other reported sites in which the worm had been found were the subcutaneous tissues and internal organs, *e.g.*, stomach, lungs and kidney. The following brief description of the worm, its life cycle and habitat has been taken from Faust (1939).

Gnathostoma spinigerum, Owen, 1836

It is a nematode of the superfamily Spiruroidea, Railliet and Henry (1915), and family Gnathostomatidae, R. Blanchard (1895). The synonyms are *Cheiracanthus,* Diesing (1836), *Cheiracanthus siamensis,* Levinsen (1890), *Gnathostoma siamense* (Levinsen), Railliet (1893). This worm was first recovered from the stomach nodule of a tiger by Owen in 1836. Since then it had been recovered from the stomach nodules of domestic cats, wild cats, leopards and dogs and oesophageal nodules in weasels in Malaya States, China, India and Japan. The first human infection was reported by Levinsen in 1890, when he studied a single immature worm obtained by Deuntzer from a breast abscess of a native woman from Siam. Since then immature worms have been recovered from peripheral abscesses, cutaneous nodules or while migrating under the skin, in Malaya, Japan, China, India, and North Queensland. The only reference of a human being harbouring the adult worm in the intestinal tract is that of Chandler (1927), who on two occasions found eggs of Gnathostoma spinigerum in examination of stools presumably human from Burma and Eastern Bengal where the infection is very common in cats. Siam is the country of greatest prevalence of this worm both in human and reservoir hosts.

Structure of adult worm.—The length of the adult male worm in tigers is 11-25 mm., and female worm 25-54 mm. In dogs they are somewhat smaller and in cats they are still restricted in size. It is reddish in colour, slightly transparent with a globular

cephalic swelling separated from the rest of the body by a cervical constriction. The oral end is frequently curved ventrad, whilst the posterior end is strongly curved ventrad and inwards. The anterior half of the worm's cuticle is provided with leaflike spines which are most common immediately behind the cervical region, become less common behind the equatorial region while the posterior part of the body is entirely devoid of spines and the cuticle is entirely smooth. Superficial annular creasings of the body are common. The head portion of the mature worm is covered with eight transverse rows of simple sharply pointed recurved hooks. The mouth opens into the oesophagus. Four club shaped cervical secretory glands are arranged symmetrically round the oesophagus.

Life cycle.—From the eggs first stage larvae are hatched in water. On ingestion by any variety of cyclops, second stage larvae develop. They are like the immature worm but much smaller. In the second intermediate host, which is either a fresh water fish, a frog or a snake, adolescent or immature worms develop. They are encapsulated in muscles, liver, mesentery or other tissues. The immature worm has a head bulb encircled by four rows of spines, a distinct digestive tract and two pairs of cervical secretory glands. The worm reaches its adult form in its reservoir host which is either tiger, cat, dog or man. The reservoir host acquires the infection by eating infected fresh water fishes, frogs or snakes. It is not known whether human infection takes place in this way or by accidental swallowing of infected cyclops in raw drinking water. It is problematical whether the larvae enter the human body via the skin or the mouth, although the latter route is the common one in other reservoir hosts.

Pathogenicity and symptomatology.—Lesions produced in the intestinal wall, primarily in the stomach, have been described from non-human hosts. They consist of indurated nodules around one or more mature or maturing worms, which lie free in an abscess pocket in the centre of the nodule. The worms are bathed in a milky purulent exudate. There is frequently an opening into the intestinal lumen through which the eggs laid by the adult females are discharged. The peripheral lesions, seen in the human hosts, are dermal or subdermal in position and consist of nodules with abscess centres or tunnels between the epidermis and corium with infiltration of a large number of eosinophils and plasma cells. The migrating variety causes creeping eruptions. The development of immature worms in peripheral abscess pockets or their migration in tunnelled passages under the superficial layers of the skin produces extreme discomfort consisting of intermittent pricking pain and continued dull pain. Marked eosinophilia is present.

Case report

M.N.S., Hindu brahmin male, aged 26 years, of Serajgunj, Northern Bengal, was admitted into the Eye Infirmary for the investigation and treatment of orbital cellulitis with haemorrhages in the retina and the vitreous in his left eye.

Habits and previous history.—He is a man of average build and looks slightly anaemic. He had very rarely visited Eastern Bengal and that was only for a day or two. His habits are regular. He lives on average bengali diet consisting of rice, pulses, vegetables and fish, milk irregularly and eggs and meat rarely. He had never eaten raw or dried fish. He does not drink or smoke. He does not remember having suffered from any serious illness, any attack of urticaria, any painful transient swelling or any creeping eruption in any part of the body.

History of present illness.—On May 25, 1944, he felt a dull aching pain on the left side of his nose extending to the frontal and temporal regions on the same side. On May 26, 1944, the pain increased and a swelling appeared on the left cheek extending to the lower eyelid. The swelling was very itchy. On May 29, 1944, the swelling had increased and spread from the angle of the mouth to the roots of the hair on the same (left) side. The eyelids were so swollen that he could not open the eye. He was running a low temperature till June 5, 1944, when he reported at the outpatient's department of the Eye Infirmary.

Examination.—On that day, he had no swelling of his left cheek and forehead, but the lids were swollen and oedematous, the conjunctiva was chemosed, movements of the eyeball were restricted, the pupil was slightly dilated and reacted to light sluggishly, the tension was normal, and the vision was 6/6. The right eye was normal. He was given treatment for orbital cellulitis including sulphonamide 4 tablets stat. and 2 tablets every 4 hours. Two days later on June 7, 1944, he reported again, complaining of dimness of vision and increase of pain in the eye. His vision had fallen to hand movements only. The swelling of the lids and the chemosis of the conjunctiva had almost disappeared and the movements of the eyeball were almost normal. The pupil was slightly more dilated and reacted sluggishly to light and the tension was normal. On examination of the fundus, the vitreous was hazy, the retinal veins were engorged and there were haemorrhages from the veins on the upper part of the disc and the upper temporal and nasal parts of the retina. On admission to the hospital on June 8, 1944, the swelling of the lids and the chemosis of the conjunctiva had completely disappeared, movements of the eyeball were normal, the pupil was still dilated and sluggish in reaction to light, tension was normal, and the

haemorrhages in the vitreous and retina had increased. On investigation, the vascular, gastro-intestinal, respiratory and nervous systems were normal. No septic foci were found in the gums, throat, nose and nasal sinuses. No albumin, sugar, or casts were found in the urine. The total R.B.C. was 3,800,000, haemoglobin was 60 per cent. The total W.B.C. was 7,200, of which polymorphonuclears were 66 per cent., lymphocytes 26 per cent., large mononuclears 4 per cent. and eosinophils 4 per cent., blood coagulation time was 3½ minutes and the bleeding time was 2 minutes. W.R. was negative. Blood taken at midnight for microfilaria was negative. B.P. was 110 systolic and 80 diastolic. In the stools a few hookworm ova were found. The anaemia and slight eosinophilia were considered to be due to hookworm infection. On June 11, 1944, three days after his admission to the hospital he developed severe iritis in the eye. The corneal epithelium was slightly oedematous, anterior chamber was hazy, there were several grey nodules on the iris of the size of a pin's head between " 11 and 2 o'clock " regions and a large irregular grey exudate between the iris and lens capsule at " 1 o'clock," the tension was slightly raised and the vision was light perception only. The iritis responded to the usual treatment and on June 13, 1944, the corneal epithelium and anterior chamber were clear, pain and ciliary injection were much less, but the pupil was only half dilated. The eye was completely quiet by June 19, 1944, the grey nodules had all disappeared leaving grey depressions on the iris and at " 1 o'clock " there was a posterior synechia and the pupil was two-thirds dilated, the vitreous haze had increased, and the vision was perception of light. At this stage the condition was considered to be one of septic (metastatic) iritis. On June 20, 1944, the eye was again irritable and a large grey nodule projecting into the anterior chamber had appeared at "6 o'clock"; the pupil had slightly contracted in spite of atropine ointment being continued, and pigmented keratic precipitates were noticed for the first time; the tension was slightly raised. On June 29, 1944, the eye was still irritable, the grey nodule at " 6 o'clock " had disappeared leaving a grey depression on the iris, and a pigmented nodule had appeared at " 5 o'clock." On July 7, 1944, the eye, which was settling down, was again irritable. The pigmented nodule at " 5 o'clock " had disappeared leaving no mark and a new pigmented nodule of larger size had appeared at " 6 o'clock." On July 12, 1944, this pigmented nodule had become larger, about 4 mm. in size, and the eye was very irritable, and the tension was raised. In the evening the nodule was found to be moving and on closer examination it was found to be a worm. On July 13, 1944, the pain was the worst the patient had ever experienced. The eye was much worse and the tension was

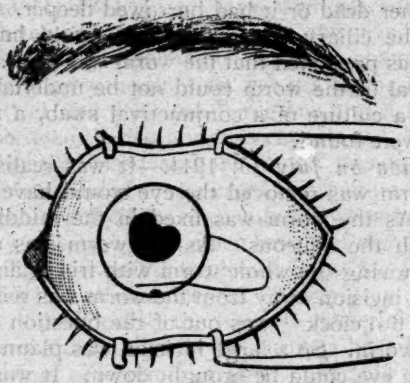
raised. On examination with the slit-lamp under a magnification of 23, the corneal epithelium was oedematous and the worm could be seen through the hazy cornea. It showed a blunt end (head) and a conical end (tail) with two spots of iris pigment attached to the tail. The head and tail showed slow wavy movements. The central part was never seen being behind the limbus evidently embedded in the iris tissue. It was translucent in appearance and a central dark streak (alimentary canal) could be seen. The appearance of the worm was not that of a filaria Bancrofti, and it was too translucent to be a maggot. So it seemed to be an unknown soft worm. On July 14, 1944, the condition of the eye was bad but the pain was a little less. The movement of the worm had stopped and the size of the nodule was smaller. The worm was either dead or it had burrowed deeper. If it burrowed deeper into the ciliary body, the pain would have been much worse, so it was presumed that the worm was dead. An operation for the removal of the worm could not be undertaken on July 13 and 14. On a culture of a conjunctival swab, a few colonies of staph. albus were found.

The operation on July 15, 1944.—It was realised that unless the whole worm was removed the eye would have to be removed ultimately. As the worm was fixed in the middle it would not gush out with the aqueous. As the worm was a soft one, the chance of removing the whole worm with iris or any other forceps after a limbal incision away from the worm was remote. A limbal incision at " 6 o'clock " was out of the question as it might cut through the worm. So a large incision was planned provided the tension of the eye could be brought down. It was decided to try to bring down the tension by blocking the ciliary ganglion and waiting for half an hour or more, and failing this to do a posterior sclerotomy. One c.c. of novocaine (2 per cent.) with two drops of adrenaline (1 in 1,000) was injected into the region of the ciliary ganglion. Fifteen minutes later, the facial nerve was blocked by O'Brien's method, and cocaine (4 per cent.) was dropped into the conjunctival sac 3 times at 5 minutes interval. Half an hour after the ciliary block the tension was found to be lower than that of the right eye. Then after all the preparations for an intra-ocular operation, a thin Graefe knife was introduced into the anterior chamber at the limbus at " 3 o'clock "; the counterpuncture was in the cornea at " 7 o'clock " about 3 mm. from the limbus. The cornea was cut through just above the worm from the region of the counterpuncture to the limbus at " 4.30 o'clock." The limbal incision was completed with a conjunctival flap. The cornea was lifted up by holding the conjunctival flap with a small dissecting forceps and a lens curette was introduced between the cornea and the iris at " 6.30 o'clock " up to the angle of the anterior chamber.

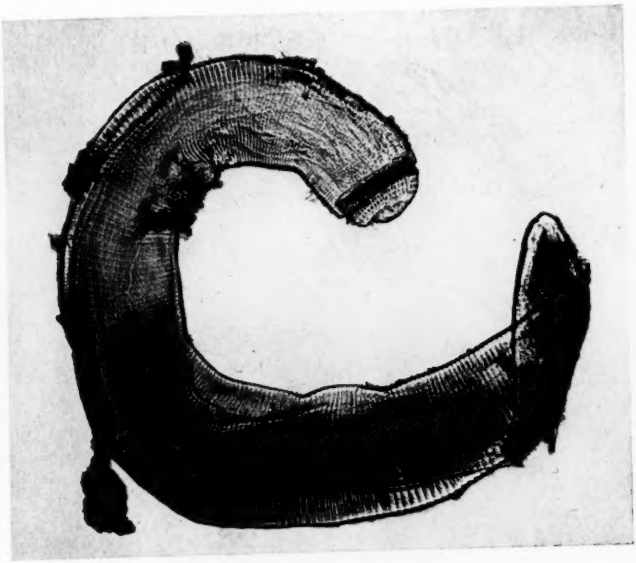
The worm was gently removed and put into a specimen tube containing 70 per cent. alcohol. There was no complication during the operation.

It was found to be a curved worm about 4 mm. long completely covered with iris pigment. Dr. A. K. Mukerji and Dr. N. V. Bhaduri of the Helminthological department of the Tropical School of Medicine, Calcutta, identified the worm as an immature Gnathostoma, and gave the assurance that the whole worm had been removed.

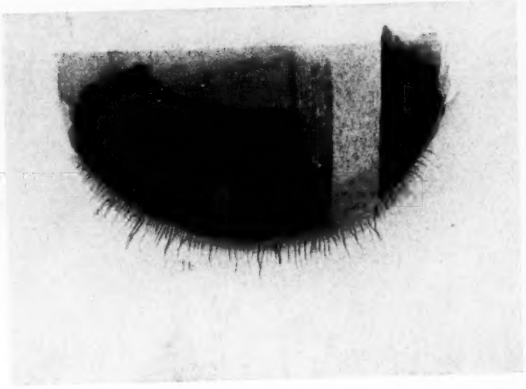
After the removal of the worm the patient made an uneventful recovery. On July 18, 1944, the eye was quiet, the cornea was clear, the pupil was widely dilated and there was neither posterior



nor anterior synechia. The fundus detail could not be seen. On July 26, 1944, some fundus detail could be seen with difficulty a few spots of haemorrhage were seen in the retina, and the disc appeared grey. He was discharged from the hospital on August 7, 1944, and was advised to report every fortnight. On discharge more fundus details could be seen, the haemorrhages had disappeared from the retina and the vision was finger counting at $\frac{1}{2}$ metre. On August 23, 1944, the vitreous was still slightly hazy, the disc was grey and the arteries were thin. The most interesting observation, however, was an ill defined circular grey area below the macula, as this might have been the spot through which the worm burrowed into the eyeball. The vision had improved to finger counting at 1 metre. On October 17, 1944, the cornea was clear, the incision mark through the cornea was just a thin line and the vitreous was quite clear. The disc was atrophic and the arteries were thin and sheathed. The ill defined grey area below



The worm after removal.



Slit-lamp view of the worm.

the macula was now a well defined scar area roughly circular in outline and surrounded by pigment and the diameter of the scar was about one-third that of the disc. As no other similar area was present in the fundus and this scar area was not present on the first day of the examination on June 7, 1944, it is thought that probably this was the area through which the worm entered the eyeball. Furthermore the diameter of the worm and the diameter of the scar are comparable in size. The vision had improved to finger counting at 2 metres.

The size of the worm, as measured by Dr. A. K. Mukerji, is as follows—length 3·5 mm., maximum width 0·41 mm., level of maximum width 1·8 mm. from the anterior end, width of the head 0·25 mm., and the number of rows of spines on head bulb 4.

Summary

Onset with a dull aching pain on the left side of the nose extending to left frontal and temporal regions, then swelling of the face extending from the angle of the mouth to the roots of the hair were followed by orbital cellulitis and vitreous and retinal haemorrhages. In the hospital, he had two attacks of iritis with the development of grey nodules on the iris which completely disappeared leaving grey depressions on the iris. This was followed by two more attacks of iritis with the development of a single pigmented nodule on the iris in each attack. The pigmented nodule completely disappeared leaving no mark after the first attack. In the second attack, which was the most severe, the pigmented nodule was seen to be the worm. The worm was removed at operation and the eye made an uneventful recovery though optic atrophy developed.

Comments

Without the discovery of the worm the case would have been most puzzling, as the condition could not be fitted into any known clinical condition. The habit of the Gnathostoma of burrowing through the tissues and migrating from place to place explained all the signs specially the inflammation which, before subsiding in one place, appeared in a contiguous place in quick succession.

If the infection took place through the gastro-intestinal tract, it must have been through swallowing infected cyclops in raw drinking water. It was not very clear how the worm came to the side of the nose from the stomach without causing any sign or symptom. However, the probable area of its entry into the eyeball from the orbit could be seen as a scar just below the macula. Marked eosinophilia is said to be a sign of this infection, but in this case eosinophilia was only 4 per cent.

Conclusion

A case of Gnathostoma in the anterior chamber of the eye is described. This is probably the first recorded case of this worm in a human eye. An incision has been planned to remove the worm which can be used for removing either a cyst or a non-magnetic foreign body from the angle of the anterior chamber.

Thanks are due to Dr. A. K. Mukerji and Dr. N. V. Bhaduri for identifying the worm, and providing the photomicrograph and the measurements of the worm, and also to Capt. E. J. Somerset, I.M.S., for many helpful suggestions in preparing the paper.

REFERENCES

1. FAUST, E. C.—Human Helminthology. London: Henry Kimpton. 1939.
2. MAPLESTONE, P. A. and BHADURI, N. V.—*Ind. Med. Gaz.*, Vol. LXXII, No. 12, p. 713, December, 1937.

A CASE OF OCCIPITAL LOBE INJURY*

BY

J. MACASKILL, Maj. R.A.M.C.

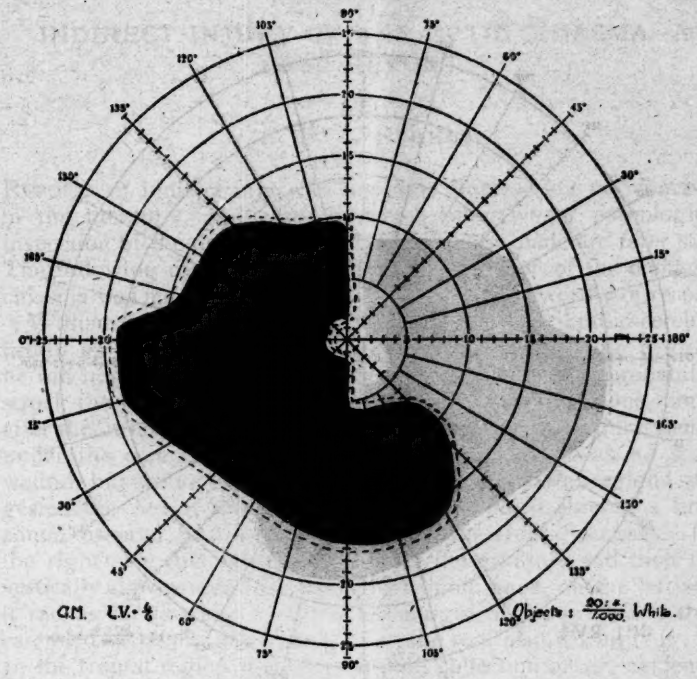
LESIONS of the occipital lobe and the ocular changes accompanying them are well known. There may be interest, however, in the record of an occipital lobe injury in which the extent and nature of the damage were demonstrated at operation.

Cpl. G. M., aged 22 years:—This soldier received a gun shot wound of the thigh at Kohima, in April, 1944. Five days later, when in the Field Ambulance, a shell burst near him and he was hit on the right side of the back of the head, and two days later received further small body wounds.

Consciousness was never lost, but after the head injury he could not see at all to the left side. One week later objects far out on this side could be seen, but he was aware of a non-seeing area towards the centre of vision. He could read newsprint but complained that while seeing one word the one adjacent to it disappeared, and on looking at his hand only saw the fingers on the right side.

When examined three months after the injury, there was a healed depressed wound in the occipital region to the right side of the mid line. Both eyes were normal and had full vision, though the letters on the chart were read scotomatously. The peripheral areas of the visual fields were unimpaired but para-central defects existed which are seen in the reproduction of the central field charts.

* Received for publication, August 8, 1945.



They consisted of left sided, homonymous, hemianopic scotomata with steep edges but the fixation areas were spared.

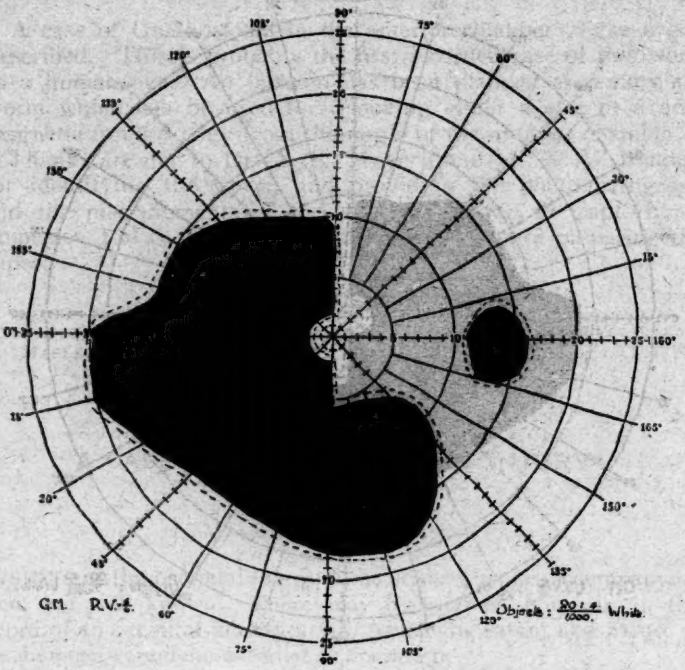
No other neurological findings were present. X-ray of skull showed several depressed bone fragments in the right occipital lobe underlying the skull defect.

At operation the old skull wound was opened and enlarged to expose healthy dura; the dural scar excised and bone fragments removed from the brain to a depth of 3 cms. Haemolytic streptococci were cultured from the bone fragments.

Discussion

Although the brain was penetrated to a considerable depth, consciousness was not disturbed, and Knight has pointed out that penetrating wounds of the brain do not necessarily result in loss of consciousness.

The field defects indicate a lesion of the posterior part of the visual cortex mainly on the right side and the findings at operation form a guide to their correlation. The initial loss of the whole field on the left side resulted probably from a functional disturbance of



all the right visual area of the brain at the time of injury, and it may be noted that recovery commenced in that part of the field which corresponded to the region furthest from the injury.

Traquair points out that sparing of the fixation area is common in occipital lobe lesions, but adds that inclusion of the fixation area in the scotomata is more frequent in damage due to injuries; though in the case reported fixation was spared.

There was no opportunity to examine the fields after operation, but the nature of the injury, and the steep edges bounding the scotomata suggest that little, if any, improvement can be anticipated.

I am grateful to the O.C. of the Neurological Centre, India Command, for permission to quote the operation notes of this case and to the appropriate military medical authorities for permission to publish.

BIBLIOGRAPHY

KNIGHT, G. C.—"The significance of minor head injuries." *Practitioner*, Vol. CLII, p. 377, June, 1944.

TRAQUAIR, H. M.—"An Introduction to Clinical Perimetry," p. 265, 1938.

INDIRECT INJURY OF THE OPTIC CHIASMA—A CASE REPORT.

BY

E. B. C. HUGHES

REPORTS of indirect injury to the optic chiasma are not common in the literature, and cases in which operative or pathological inspection of the damaged chiasma have been made are rarer still. The following case in which a careful inspection of the damaged chiasma was made at operation, seems, therefore, worthy of record.

William U., aged 45 years, sustained a severe cranio-cerebral injury as the result of a road accident. While driving a lorry, he ran into the back of a stationary vehicle, and in all probability struck the front of his head against the windscreen. One month after this injury he was admitted to an E.M.S. Head Injury Centre under the care of Mr. Harvey Jackson. There was no scalp wound, but severe bruising of both orbits and frontal regions suggested the site of injury. X-Rays of the skull showed a horizontal fissured fracture running above the frontal sinuses. On the right side this extended just over the midline, and then ran vertically downwards into the right frontal sinus, on the left side it ran as far laterally as the outer margin of the orbit and then extended vertically downwards on to the roof of the orbit (Fig. 1). In the frontal region there was a small collection of air, evidently in the frontal pole of the brain, with a narrow track leading down to the right frontal sinus. A post-traumatic amnesia of twenty-four hours and a lumbar puncture shortly after injury showing a small admixture of blood and some sixty cells per cu. mm. in the C.S.F. indicated the severity of his generalised cerebral injury. The neurological signs on admission consisted of complete bilateral anosmia, complete facial paralysis on the right with loss of taste, and a mild left hemiparesis with increase of tone and of the deep reflexes. Both optic fundi showed similar appearances; the optic discs were abnormally pale, but the retinal vascular tree was normal. It seemed certain that he had moderate primary optic atrophy in both eyes. The visual acuity was 6/9 in each eye. The visual fields showed complete loss of the temporal field in each eye. Sparing in the macular region was thought to be present at first, but subsequent careful testing failed to demonstrate this. The nasal fields were quite normal, even to 1/2000 white there was no " greying " and no quadrant sign for colours (Fig. 2).

Exploration was carried out seven weeks after injury by Mr. Harvey Jackson through a right frontal bone flap. The primary

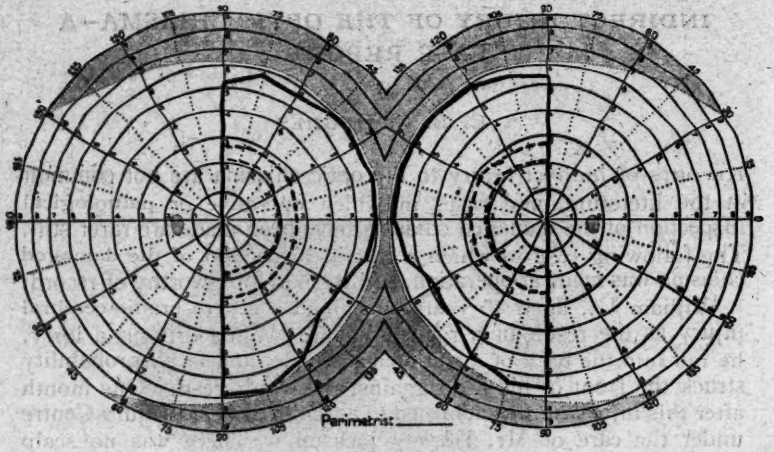


FIG. 2.

Visual fields four weeks after injury, showing complete loss of both temporal fields, normal nasal fields. Visual angles $\frac{1\cdot2}{2000}$ and $\frac{1\cdot20}{330}$

object of this operation was to repair the dural defect in relation to the right frontal sinus, and this tear was identified through an intradural approach and repaired. Retraction of the right frontal pole allowed an excellent view of the optic nerves and chiasma. The right optic nerve was examined closely from its exit from the optic canal to its junction with the chiasma and appeared to be quite normal. The left side of the chiasma and the left optic nerve were partly obscured by recent greyish-yellow filmy adhesions; these were easily brushed away. The left optic nerve also appeared to be normal. No gross injury of the chiasma could be seen, and there was not the slightest suggestion of an antero-posterior tear (Fig. 3). His recovery from this operation was quite uneventful.

No change has been noted in the fields and the fundi up to the present date four months after injury. There seemed to be little doubt from questioning the patient, and from his previous hospital records, that a bitemporal field loss had been present from the time of injury, which had not altered appreciably since.

Discussion

The pathogenesis of this type of injury still remains in doubt. Several hypotheses have been suggested in the past, including simple antero-posterior tear (Coppez, 1929), and intrasellar

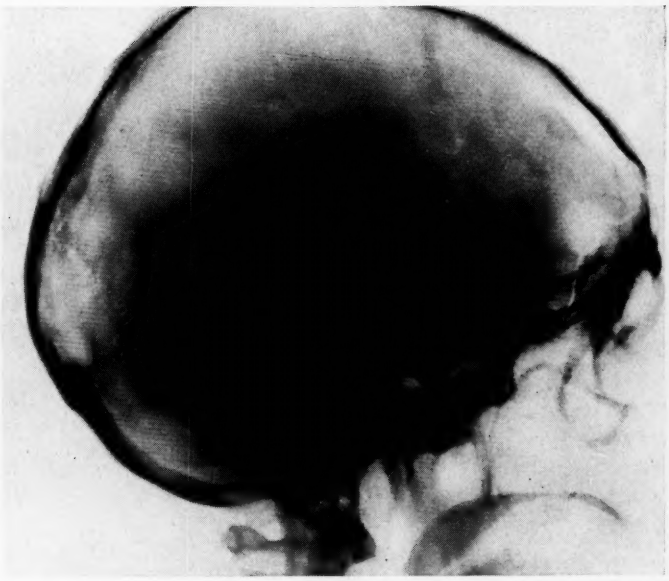


FIG. 1.

Lateral X-ray of skull showing fissured fracture extending down on the left side into the roof of the orbit.

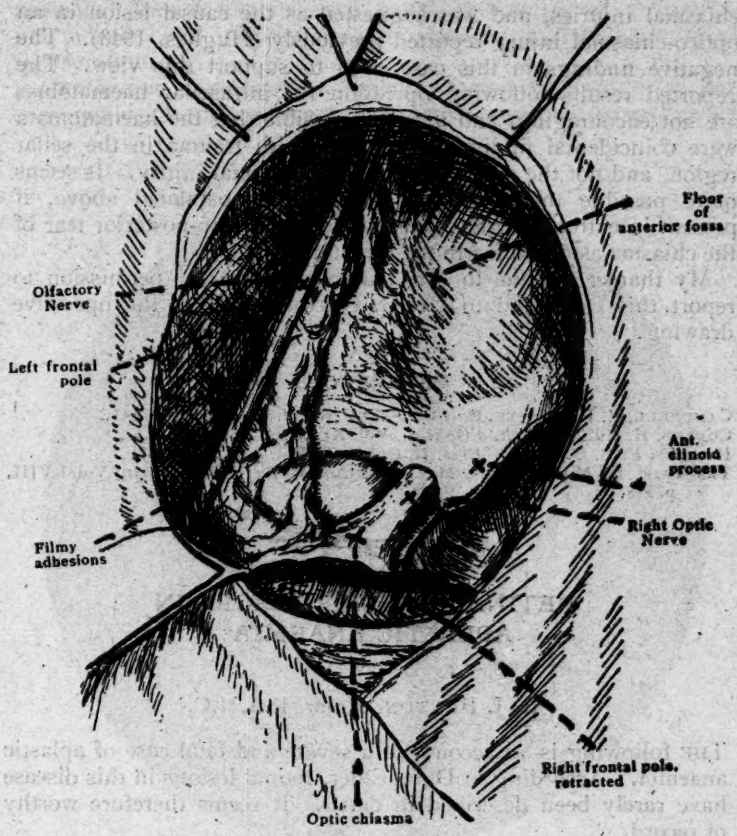


FIG. 3.

Operative drawing showing right and left optic nerves and the chiasma without any evidence of gross injury. The left optic nerve and left side of chiasma are covered by filmy adhesions.

haematoma (Campbell and White, 1938), both of whom have produced operative or pathological confirmation of their hypotheses. The number of cases in which no gross lesion of the chiasma has been found is growing, and Traquair, Dott, and Russell (1935), after a review of the literature and of their own cases, put forward the theory that the lesion was due to damage of the small vessels of the chiasma resulting most probably from a stretch injury. This has seemed to the author to be the most probable explanation of the majority of indirect optic nerve and

chiasmal injuries, and was suggested as the causal lesion in an optico-chiasmal injury reported previously (Hughes, 1943). The negative findings in this case seem to support this view. The reported results following operation for intrasellar haematomas are not encouraging, and it seems possible that the haematomata were coincidental findings, associated with trauma in the sellar region, and not the actual cause of the chiasmal injury. It seems quite possible that the stretching injury postulated above, if present in extreme degree, might result in antero-posterior tear of the chiasma as described in the literature.

My thanks are due to Mr. Harvey Jackson for permission to report this case, and to Dr. S. Schwarzwald for the operative drawing.

REFERENCES

CAMPBELL, E. H., WHITE, E. (1938).—*N.Y. St. Jl. Med.*, pp. 380, 841.
COPPEZ, H. (1929).—*Arch. d'Ophtal.*, Vol. XLVI, p. 705.
HUGHES, E. B. C. (1943).—*Brit. Jl. Ophthal.*, Vol. XXVII, p. 367.
TRAQUAIR, H. M., DOTT, N. M., RUSSELL, W. R. (1935).—*Brain*, Vol. LVIII, p. 398.

RETINAL HAEMORRHAGES IN APLASTIC ANAEMIA*

BY

R. J. BUXTON, Major, R.A.M.C.

THE following is an account of a severe and fatal case of aplastic anaemia. According to Duke-Elder, retinal lesions in this disease have rarely been described in detail. It seems therefore worthy of record.

Case history.—The patient was a Basuto, aged 28 years, with 3½ years Army service. On January 15, 1945, he was admitted to 65th (Br.) General Hospital with a history of two day's illness, aching all over, fever and bleeding gums. He had had syphilis, and had completed two full courses of arsenic and bismuth. He had received the first injection of the third course on January 12.

He was found to have a slightly raised temperature and pulse, a cardiac systolic murmur, and a very abnormal blood picture. Haemoglobin was 16 per cent., red blood cells 750,000; colour index 1·06; white blood cells 3,100; polymorphs 19 per cent.; lymphocytes 78 per cent.; mononuclears 3 per cent.; very few platelets. Bleeding time was very prolonged. Clotting time was

* Received for publication, April 20, 1945.

normal. Blood film showed gross deficiency of red cells, polymorphs and platelets; there was no evidence of blood regeneration.

Ophthalmic examination.—There was marked pallor of the conjunctivae, but the external appearances were otherwise normal;

there was no strabismus; no abnormality in the pupils; optic media were clear.

The fundi showed gross changes. The optic discs showed blurring of the upper nasal edges only. Retinal vessels were normal in size and contour, with slight haziness of outline near the discs. There were gross haemorrhages, all nearer the discs than the periphery and the majority close to the larger blood vessels. They were of these types:—

(1) Moderate-sized, flame-shaped plaques up to 2 D.D. long, some with a yellowish centre, sometimes glistening slightly.

(2) Narrow streaks, about 1 D.D. long, close to blood vessels.

(3) Two or three punctate haemorrhages in the macular areas. One small exudate was noted.

There was generalised retinal pallor, especially noticeable in a Basuto; at the same time there was a slight degree of retinal oedema in the area surrounding the optic disc.

Treatment.—He was given a number of blood transfusions; ascorbic acid 300 mgms. daily; neohepatex 2 c.c. intramuscularly daily; ferri and ammon. citrate t.d.s.

Course.—A sternal puncture was performed. Total leucocytes 6,300 per cu. mm. differential count; polymorphs 12·5 per cent., lymphocytes 78 per cent., monocytes 2·5 per cent., eosinophils 1 per cent., myelocytes 1·5 per cent., myeloblasts 3·5 per cent., megaloblasts 1 per cent. The small number of immature cells suggested gross atrophy of the marrow.

January 24. Ten pints of blood had been given. Red cells and haemoglobin were brought to satisfactory levels, but virtually none of the leucocytes and platelets had survived. No reticulocytes were found. There were still no signs of any bone marrow activity.

January 26. Retinal haemorrhages show a slight absorption, with no fresh ones.

February 5. The haemoglobin had dropped to 29 per cent. Leishman films showed very few platelets, very few leucocytes and an occasional polymorph. There was no evidence of blood regeneration. Patient was worse, with free bleeding from nose and gums and haematuria.

February 7. Patient died.

Post-mortem report.—Brain showed intense pallor with small petechial haemorrhages on the under surface of the cerebellum and medulla. Thorax: lungs had no haemorrhages; the epicardial surface of the heart was covered with fresh haemorrhages. Abdomen: stomach mucosa and the intestines showed fresh haemorrhages; normal but pale liver; haemorrhages in the kidneys and suprarenals; spleen had old haemorrhages. Sternum: no active marrow; femur: right femur had only two patches of active marrow; remainder was soft and pale. Eye: one eye was excised and macroscopically showed an increase in number and size of the haemorrhages, most numerous along vessels and just lateral to macula; largest haemorrhage was 3 mm. long.

Comment.—This is a classical pathological picture of aplastic anaemia; there is no blood regeneration. It is not certain whether the venereal treatment was a causal factor in the condition, but in view of the fact that his symptoms started immediately after the first injection of the third course of arsenic, and that he had already had two courses without ill effects, an idiopathic origin is

more likely. He was kept alive for 3½ weeks with blood transfusions, but at no time was there any evidence of regeneration from the marrow. Post-mortem showed the classical picture of complete bone marrow aplasia and multiple submucous haemorrhages.

My thanks are due to Colonel G. T. Gimlette, A.M.S., for permission to publish this case, and to Sergt. M. Suart, R.A.M.C., for his painting of the fundus.

REFERENCE

DUKE-ELDER.—Textbook of Ophthalmology, Vol. III.

HAEMORRHAGE FROM THE CONJUNCTIVA*

Notes on a case of capillary angioma

BY

J. PENDLETON WHITE

GLASGOW

ON November 25, 1944, a married woman, aged 40 years, complained of having suffered on two occasions from bloody tears. About six weeks previously during the evening she felt something hot running from her right eye, and on applying her handkerchief she noticed that it was stained with blood. The onset had no association with menstruation, and the patient was a healthy woman entirely free from any hysterical signs or symptoms. There was no history of injury, and none of haemophilia in the family. Examination of the blood revealed no abnormality. The bleeding on the first occasion lasted for a few minutes and was arrested by tightly applying her handkerchief to her eyelids.

She had one subsequent attack about a month after the first. On everting the right upper eyelid a small reddish growth about 3 mm. by 2 mm. was noted on the palpebral conjunctiva near the superior margin of the tarsus. This was seen by the slit-lamp to be highly vascular. The growth was excised along with a piece of the tarsus, and a stitch inserted. There was no subsequent haemorrhage.

On histological examination the excised tissue showed the following characteristics.

It had a thickness of 1 mm. It contained the Meibomian glands and a richly infiltrated fatty sub-conjunctival tissue. The

* Received for Publication, May 19, 1945.

epithelium was flat and thin in the tarsal region, and was well preserved in the area of the fornix. Here the conjunctiva was laid in many folds, and the epithelium was full of goblet cells. Most of these folds were vascularised normally, but one especially was practically filled (Fig.) by a convolution of thin walled vessels of 12-30 micron. The reticulum between the capillaries of the angioma was full of lymphocytes. Where the capillaries reached the epithelium it appeared to be reduced locally to one row.

It would appear therefore that the capillary angioma was the source of the haemorrhage.

Conjunctival angiomata are comparatively rare, but if the conjunctiva is studied carefully with the slit-lamp some small ones are sometimes noted.

A lesion of the very thin epithelium over some of the thin-walled vessels may easily lead to haemorrhage. It may even be that slight pressure upon the eyelid might suffice to rupture the superficially unprotected angioma.

An angioma may occasionally show a swelling similar to that of the corpus cavernosum and this could easily lead to haemorrhage.

The literature records many interesting cases of "bloody tears," the most interesting being that of the girl Therese von Konnersreuth published by Hyuek (1932) who during "the

ecstasy of Good Friday" wept tears of blood. This was regarded as a hysterical manifestation.

The main point of interest in my case is that the source of the haemorrhage could be so definitely demonstrated. A case of severe haemorrhage from an ulcerated naevus leading to a state of collapse was recorded by Jessop in 1898.

Apart from injury bleeding from the conjunctiva must be a somewhat rare occurrence. In the course of a very long experience in an industrial area I have never met with this before. I have everted thousands of eyelids in a population exposed to frequent minor injuries, and I have never seen a capillary angioma situated on the palpebral conjunctiva which could be attributed to trauma. It is unlikely, therefore, that this angioma had any association with injury.

I am indebted to Professor Loewenstein for his histological notes and to Mr. John Watt for his technical assistance. My thanks are also due to Professor W. J. B. Riddell for kindly placing the resources of the Tennent Institute at my disposal.

BIBLIOGRAPHY

HYUEK. KONNERSRBUTH (*Trans. Shepherd*), London, 1932.
JESSOP.—*Trans. Ophthal. Soc. U.K.*, Vol. XV, p. 64, 1895.

A CORNEAL GRAFT OPERATION FOR RECURRENT PTERYGIUM*

BY

Lieut. J. L. REIS, Polish A.M.C.

OPHTHALMIC SPECIALIST, POLISH GENERAL HOSPITAL, C.M.F.

THE common methods of pterygium operations aim at the separation and displacement of the pterygium from the cornea. This leaves an open wound of the cornea, where a cicatricial opacity, with tendency to vascularisation, develops. It is not unusual for this corneal scar to get covered with conjunctiva, thus forming a pseudopterygium.

Not infrequently the pterygium recurs and has the same appearance as the stationary pseudopterygium but differs from the latter by its tendency to grow and that it has no marginal folds. So the results of those operations are not very satisfactory, both from the cosmetic as well as from the functional point of view.

* Received for publication April 19, 1945.

Some authors, basing their views on the pathology of pterygium —which shows corneal dystrophy rather than conjunctival hypertrophy—use a corneal graft to cover that part of the cornea from which the pterygium has been removed. This procedure gives not only better optical and cosmetic results, but also seems to prevent recurrences.

Magitot of Paris,* about 20 years ago, published his method of taking a corneal graft from the upper part of the affected cornea. After separation of the pterygium from the cornea he prepares a conjunctival flap covering the part of cornea affected by the pterygium. Then, using a trephine, he makes a semi-circular superficial incision with its base upwards on the upper part of the cornea, close to the limbus. Next he separates with a special knife a flap of the superficial layers of the cornea. Finally he slides the corneal graft thus obtained to that part of cornea from which the pterygium was removed, and under the previously prepared conjunctival flap.

Filatov in Russia performs a similar operation, taking corneal grafts from other eyes, even those of fresh corpses.

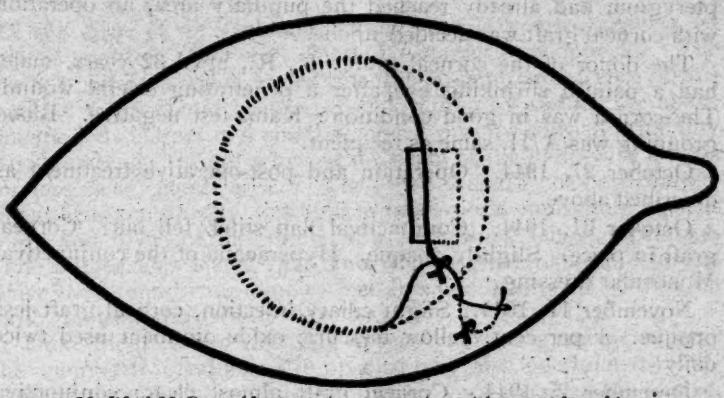
These superficial corneal graft operations in pterygium cases have so far not been commonly used; perhaps because conjunctival sepsis impaired the results in a proportion of cases. At present we are in a much more fortunate position than we were some years ago, being equipped with powerful bacteriostatics such as sulphonamides and penicillin, and therefore being able to expect much better results from corneal grafts.

The operation which I have performed is based on the method described above. It can be undertaken when an opportunity occurs of enucleating an eyeball which has a reasonable cornea in a healthy patient. The enucleation is performed just before the pterygium operation and the excised eyeball put into a sterile 1 per cent. saline solution.

Usual anaesthesia consists of 5 per cent. cocaine instillations and a subconjunctival injection of novutox-adrenalin solution. The first stage of operation is a modified McReynolds method. After a deep dissection of the pterygium from the cornea with a Graefe knife, the conjunctiva is separated from the limbus and undermined more widely than in the usual McReynolds operation. After fixing the head of the pterygium in the subconjunctival pocket, a stitch is inserted joining the lower limbal margin of conjunctiva with the former upper margin of pterygium. It results in forming a conjunctival flap and stretching it over the corneal area previously covered by pterygium (diagram).

* As this paper is written abroad on active service, I have no access to original papers. It is also reported in *Le pterygion, Merigot de Treigny, Bull. de la Soc. d'Ophtal. de Paris*, 1933.

Now with a Graefe's or Beer's knife a superficial corneal layer from the enucleated eyeball is dissected, after its margins have been delimited by two parallel, superficial incisions. Its size will depend on extent of the denuded cornea to be covered, and will therefore vary from 3 to 5 mm. This graft is transferred on the knife blade and slid on to the cornea of the recipient. Then the conjunctival flap is raised slightly with opened forceps and the



Modified McReynolds pterygium operation with corneal grafting.

graft is slid underneath. It is not essential that the conjunctival flap should cover the whole of the corneal graft.

After putting calcium penicillin-sulphathiazole powder into the conjunctival sac, both eyes are closed with a pad and bandage. The first dressing is done the next day and afterwards daily, atropine drops and penicillin solution are instilled. The unoperated eye is left open on the fourth day and sulphanilamide ointment is inserted twice daily instead of the penicillin powder. If the stitch forming the flap does not fall out itself, it is removed on the fourth day, the stitch holding the head of the pterygium can remain some days longer.

Description of case

J. W., aged 44 years, male, noticed a pterygium on his right eye since 1939. In October, 1943, operation elsewhere. Recurrence of pterygium; operation again in March, 1944. I saw him for the first time on September 31, 1944, and found that his pterygium had again recurred.

Examination:—Left eye: normal, V=6/5. Right eye: conjunctival fold covering 4 mm. of cornea, reaching the pupillary

area. Some superficial corneal opacities in advance of its head. Slight congestion of pterygium vessels. V=6/12 retinoscopy after homatropine: normal refraction with some irregular astigmatism caused by the pterygium: V. not improved by glasses.

October 20, 1944. Admission to hospital. Considering the size of the pterygium and in view of the fact that delay might cause further increase of its size which would be very inadvisable as the pterygium had already reached the pupillary area, an operation with corneal graft was decided upon.

The donor of the corneal graft. K. R., aged 32 years, male, had a painful shrinking eye after a penetrating scleral wound. The cornea was in good condition: Kahn test negative. Blood grouping was A/II, same as recipient.

October 27, 1944. Operation and post-operative treatment as described above.

October 31, 1944. Conjunctival flap stitch fell out. Corneal graft in place. Slightly opaque. Hyperaemia of the conjunctiva. Monocular dressing.

November 11, 1944. Slight ciliary injection, corneal graft less opaque. 1 per cent. yellow mercuric oxide ointment used twice daily.

December 2, 1944. Corneal graft almost clear; conjunctiva normal. V=6/9. Slit-lamp examination: Vascularisation of the corneal epithelium in the peripheral parts of graft. Small blood vessels going out from limbus seem to stop on the edge of the corneal graft.

Discharged from hospital.

March 7, 1945. Examination: Condition as on discharge from hospital.

Summary

(1) In cases of recurrent or advanced pterygium a partial corneal graft is indicated.

(2) A modified McReynolds pterygium operation is described, in which the denuded corneal area is covered by a corneal graft.

I have to thank Col. F. Balaszeskul, commanding officer of a Polish General Hospital, and Lieut.-Col. B. W. Rycroft, O.B.E., Adviser in Ophthalmology, A.F.H.Q., Central Mediterranean Forces, for permission to publish this paper, and I would like to express my gratitude to Major B. Gluck, R.A.M.C., for his great help and advice in its preparation.

COPPOCK CATARACT AND CATARACTA PULVERULENTA CENTRALIS*

BY

Captain EMANUEL ROSEN, M.C.

NEWARK, N.J.

IN the *Brit. Jl. of Ophthal.*, 1942, page 152, there appears an article entitled " Doyne's Discoid Cataract " (Coppock). The author had been asked to describe the slit-lamp appearance of this type of cataract and he proceeded to do so by stating the above mentioned cataract is a small biconvex opacity consisting of tiny spots looking " bright white in the beam of the lamp with a more or less clear central area." The " y's " could not be definitely identified; the opacity appeared to involve the embryonic nucleus only and to be of the nature of a very small lamellar cataract. The author also stated that since the original report,[1] cataracts have been found from time to time in cases having no connection with the Coppock family.

Duke-Elder[2] states that this opacity may be granular or may be completely opaque. The opacity may also be situated in the embryonic or foetal nucleus, and it may vary considerably in size. The centre of the cataract may occasionally be clear. Frequently the opacity is associated with other opacities. The condition is considered rare and possesses a strong familial tendency. Duke-Elder recognizes that Coppock cataract and cataracta pulverulenta centralis first described by Vogt[3] in 1922 are one and the same thing.

Nettleship in his original description stated the cataract was a flat sharply outlined disc lying between the nucleus and the posterior pole and always revealing a clear zone of cortex between it and the posterior capsule. Nettleship also stated that occasionally the cataract may show a triradiate marking which may connect it with the posterior " Y " suture. (His illustration on pages 194-195, Fig. shows this cataract.) It is noteworthy that this author attempted to show consanguinity as a cause of this degeneracy(?) but the cataract was shown to appear in only one of the consanguineous marriages. In this original communication the author states that the opacity takes the shape of a sharply defined circular disc in which case a triradiate structure is evident. (Mrs. Packford, aged 24 years.) Two or three other cases show slight evidence of this rather indefinite triradiation. The usual cataract is about 4 mm. wide, always bilateral and symmetrical.

* Received for publication, August, 1944.

There is a whole series of gradations in the cataract from a fairly dense gray disc to a barely perceptible translucent opacity.

Ida Mann[4] states that this type of cataract usually forms about the sixth month of foetal life; is probably due to a metabolic disorder and is related to lamellar cataract. It is also noteworthy that Ida Mann thinks this type of cataract requires further study and it is primarily for that reason that I wish to present some slit-lamp photographs of this condition so that some further observations may be offered upon both its occurrence and its biomicroscopic appearance.

It is suggested that the name " Coppock " cataract is poorly chosen for, although the condition was first described in that family, it is quite evident that the same type of opacity was present in a great many unrelated people. This becomes evident when it is noted that there were several coloured patients amongst the twenty-four cases of this type of cataract seen in the past eighteen months. I had regarded these cases as " cataracta pulverulenta centralis " and to show their biomicroscopic appearance I have undertaken some special slit-lamp photographs.

The first case (Fig. 1) is a typical cataract of the type under discussion. The opacity is seen to occupy the most central portion of the lens with its centre being somewhat transparent. The disc itself is made up of tiny white highly refractile dot-like deposits

FIG. 1. (High power)

located in the foetal nucleus with only the lucid interval separating the anterior and posterior portions. The " Y " sutures are in this same zone and can be made out more or less incompletely. The disc appears to have a greater posterior than anterior bulge. In some of the spaces between the small white dots are areas which resemble microscopic vacuoles seen in immature senile cataract.

FIG. 1. (Low power)

Cataract depicted in Fig. 2 is very similar to that of Fig. 1 but the small white dots are more closely crowded and there is less reflection of light from these particles. There is a clear central interval and a clearer cortical area surrounding the disc. There

FIG. 2.

is no pronounced difference in the anterior and posterior curvature of the lens.

In the third case (Fig. 3) an antero-posterior view shows the opacity to be approximately 2½ mm. in diameter and again made up of the characteristic small white dots gathered within a circle. With the broad beam of the slit-lamp it is seen that the opacity is

more spherical than disc-like. It is definitely not a flat disc. Again, there is a fairly clear central interval. This patient closely resembled an albino.

Fig. 4 is similar to the previously described cases although the opacity itself is somewhat smaller than Figs. 1, 2, 3. The cataract

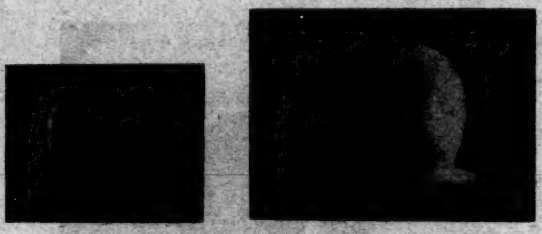


FIG. 3.

here too is made up of the same small crystalline elements. An interesting sidelight of this case was the "coupling" of camptodactyly with these cataracts, a condition which will be reported in more detail at a later date. In this same case there were also three small "spokes" just posterior to the opacity which, however, were not typically triradiate in arrangement.

It might be of some interest to point out that in three of these cases with definite diagnosis of cataracta pulverulenta centralis, some endocrine dysfunction was noted. In one case the patient was a twenty-six year old male who had soft silky hair with female distribution, absence of hair from face, adiposogenital dystrophy and a high-pitched voice. In a second case the ultimate diagnosis was "renal rickets." In this case the congenitally small kidneys led to a series of orthopaedic, hypertensive and endocrinologic complications. The third case had an acrocyanosis associated with this type of cataract.

Since there is a campaign on at present to discard names used for description of definite entities, it appears that an attempt should be made to delete the name "Coppock" cataract and replace it by an anatomically selected term.

REFERENCES

1. NETTLESHIP and OGILVIE.—*Trans. Ophthal. Soc. U.K.*, p. 191, 1906.
2. Text-book of Ophthalmology, Vol. II, p. 1368.
3. VOGT.—*Arch. f. Ophthal.*, Vol. CVII, p. 235, 1922.
4. MANN, IDA.—Developmental Anomalies of the Eye.

DIABETIC NEEDLES*

BY

Captain EMANUEL ROSEN, M.C.

NEWARK, N.J.

THERE are many signs in ocular diabetes which may be regarded as presumptive—not least among which may be considered rubeosis iridis; dispersion of pigment from the posterior surface of iris during iridectomy; presence of small globular haemorrhages in the macular region; hard white diabetic exudate seen in the macula; presence of retinitis proliferans; retinitis circinata; sudden appearance of hyperopia; lipaemia retinalis; failure of pupil to dilate to mydriatics and grapevine formation of vessels. For the most part these various characteristics have been elaborated and are well known by ophthalmologists.

The lens has frequently been studied with the slit-lamp and an endeavour has been made to point out some specific features biomicroscopically to render a pathognomonic feature in cases of diabetic cataract. There has been little or no agreement upon this point and most slit-lamp microscopists are convinced that there is no such thing as a diabetic cataract in the usual type of diabetes seen in older people. Of course the rapidly forming cataract seen in young individuals, which may develop in a few weeks, is a specific type of cataract characterized by small snow flake globules located subcapsularly, but this cataract occurs in the diabetes which is seen only infrequently.

About eight years ago through accident or otherwise, a lenticular sign was observed in diabetics which has remained fairly constant and most assuredly should be considered a presumptive if not a positive diagnostic sign in diabetes. The sign is not constant but when present is specific for diabetes. It has come to be known as the Diabetic Needle or Roman Numeral sign and was given the name because of the resemblance of these lenticular opacities to the above named configurations. Characteristically, when the pupil is dilated and when the red reflex is studied with the indirect ophthalmoscope or the retinoscope a spoke formation is seen in the periphery of the lens which is a linear black streak no thicker centrally than it is peripherally. This is its most important feature—the spoke is never thicker at the periphery than at its central termination and even in cases where there is adult spoke formation in the lens, characteristic of early change in senile cataract, still there may be superimposed upon this cataract formation, the characteristic " diabetic needle."

* Received for publication, August, 1944.

Summary

A series of 19 cases of diabetes is presented. These patients all exhibited the so-called diabetic needle sign. Many of the cases showed nuclear and cortical lenticular opacities but even in these patients when the red reflex was carefully studied the diabetic needles could be picked out from the other lenticular opacities. Case 13 is of particular interest since routine blood sugar and urine studies were negative and with performance of a modified sugar tolerance test a suggestive diabetic curve was secured. This physical sign is offered to opthalmologist as well as internist as another characteristic to add to the many specific diabetic indicators.

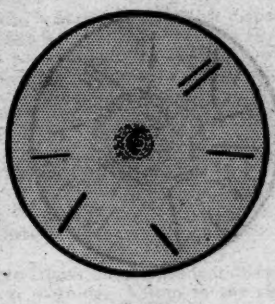
CASE 1.—Mrs. M.K., aged 55 years. This patient has been a diabetic for three years. At present she is using 30 units of insulin daily. The patient's vision was 20/30 in each eye and was corrected to 20/30− in each eye. Posterior polar cataracts were present in each eye—more involved on the left side than on the right. The characteristic diabetic needles were present and were more marked on the left than on the right side. One small round haemorrhage was found in the macular region of the right eye. The arteries showed an increased tortuosity and an irregularity in the light reflex.

CASE 2.—Mrs. G.B., aged 50 years. This patient has been a diabetic for six years. She is using 15 units of insulin daily. Vision in the O.D. is 20/40− correctible to 20/30. Vision in the O.S. is 20/30− correctible to 20/25. Study of the lens under dilatation reveals typical diabetic needles, more pronounced in the left eye than in the right eye. There were no other changes in either lens. In the left macula there was one small spherical haemorrhage. The blood vessels showed occasional arterio-venous constriction and an occasional widening of the light streak along the course of some of the arteries. The blood pressure 130/84.

CASE 3.—Mrs. C.Z., aged 55 years. This patient states that she has had diabetes for four years. At present this patient uses 10 units of insulin each evening. Vision in the O.D. 20/40−1 correctible to 20/30. Vision in the O.S. 20/30−2 correctible to 20/30. Study of the lens under dilatation which was accomplished with homatropine and paradrine under difficulty, showed the presence of 4 characteristic diabetic needles in each lens. There were no other changes in the lens. Fundus examination showed the presence of several "cork screw" macular twigs and a definite tortuosity of the veins. There was considerable quantity of "hard" diabetic exudate in each macular region. There were no retinal haemorrhages. A suggestive temporal pallor of the disc was present on each side but visual field studies disclosed no disturbance of the fields.

CASE 4.—Mrs. G.A., aged 67 years. There was no knowledge of the patient having diabetes and the eye examination was one for routine refraction and presbyopic correction. The patient's vision was 20/100 in each eye and was correctible to 20/30 in each eye. Examination of the lens under dilatation revealed the presence of diabetic needles, more pronounced in the right than in the left eye. The fundus examination showed no changes of any moment—certainly nothing which could be associated with diabetes. Urine examination disclosed the presence of sugar—reported as 2 per cent.

CASE 5.—Mrs. L.G., aged 62 years. This patient has had diabetes for 15 years. At present she is using 25 units of protamine zinc insulin daily. One year prior to her initial examination a preliminary iridectomy was performed upon her right eye at the New York Eye and Ear Infirmary. Examination showed an artificial coloboma of the right iris along with nuclear sclerosis of both lenses with typical diabetic needles superimposed upon the nuclear changes. A characteristic diabetic retinitis could be seen with difficulty. Vision was 15/200 in each eye and could not be improved.



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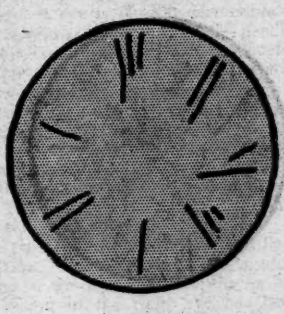

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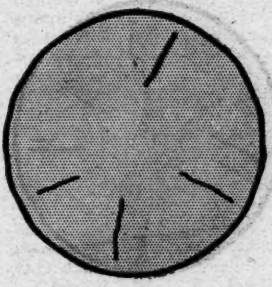

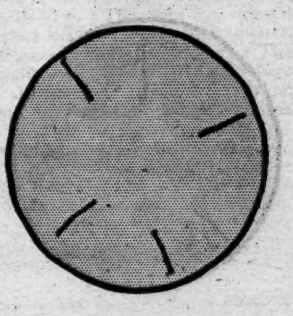

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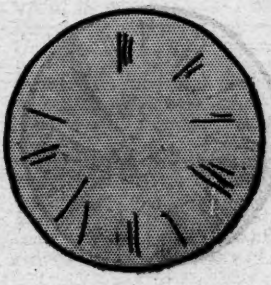

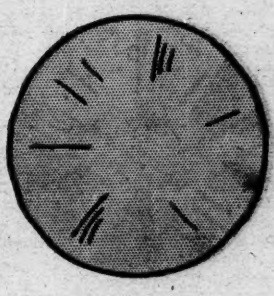

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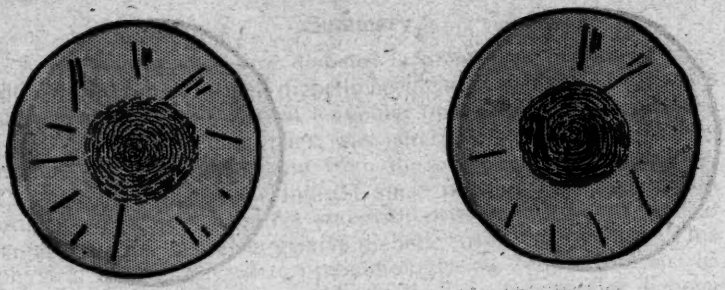

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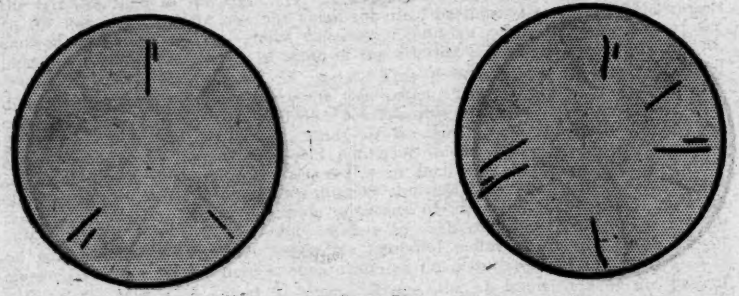

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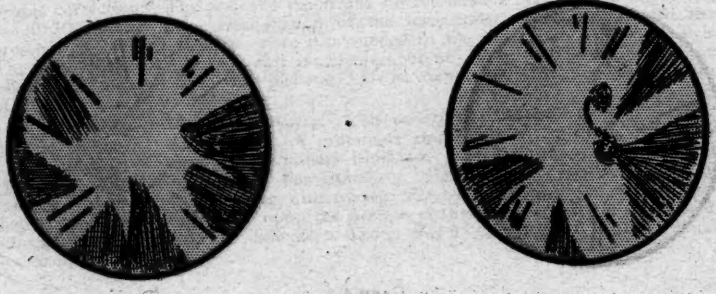


CASE 8.

CASE 6.—Mr. M.D., aged 73 years. This patient is known to have had diabetes for 15 years—of mild character and never having required insulin. Vision is 20/70 in right eye and 20/200 in left eye. There is no improvement of vision with glasses. Examination of each lens under dilatation shows the presence of many diabetic needles. In the left macula there are many exudates and haemorrhages which are characteristically seen in diabetes. Similar but less marked changes are present in the right eye ground.

CASE 7.—Mrs. E.Z., aged 63 years. Diabetic of 10 years duration and at present is using 15 units of regular insulin. Vision is O.D. 20/100 correctible to 20/20, O.S. 20/100 correctible to 20/20. Examination of media under dilatation shows a few typical diabetic needles in the periphery of each lens. The eye ground studies show some exudate in each macula. There are several areas of arteriovenous constriction.

CASE 8.—Mr. M.K., aged 55 years. This patient knows that he has had diabetes for two years. He uses 10 units of insulin each morning. Vision in the right eye is 20/70 correctible to 20/30. Vision in the left eye is 20/200 correctible to 20/30. Study of the lenses under dilatation discloses several diabetic needles superimposed on to typical early and characteristic cortical senile opacities located in the lower nasal quadrant of each eye. There are some floating vitreous opacities in the left eye. There are no pathologic changes in the eye grounds.

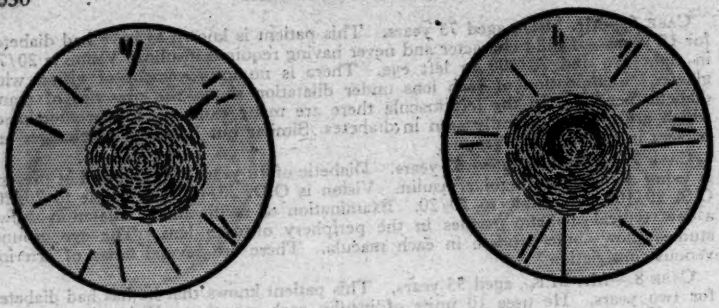
CASE 9.—Mrs. S.U., aged 65 years. This patient discovered that she had diabetes about 6 months prior to her eye examination. This patient does not use insulin. Vision has become much worse in the past six months. Vision in O.D. 20/50—O.S. 20/200 with no improvement with glasses. Media examined under dilatation shows several peripheral diabetic "needles" and another type of lenticular opacities, viz., "nuclear." Examination of the fundi shows a diabetic exudative retinitis along with several characteristically diabetic haemorrhages.

CASE 10.—Mr. D.R., aged 34 years. For the past three years patient has been under diabetic regime using 40 units of insulin daily. The patient has had gradual loss of vision in right eye for about one year and in the past four months he has noticed a beginning cloud over his left eye. Vision in the right eye has been reduced to light perception and in the left eye is 20/30−. The right eye showed severe and advanced diabetic retinitis with numerous haemorrhages and exudates, especially in the macular region and a very extensive retinitis proliferans. The red reflex could hardly be obtained from the right eye. In the left eye there were 12 diabetic needles of almost symmetrical distribution. The eye ground showed occasional haemorrhages and exudate with a tendency toward retinitis proliferans.

CASE 11:—Mrs. B.W., aged 69. This patient has had diabetes for 16 years and at present uses 6 units of insulin once daily. The patient knows that upon one occasion her blood sugar has been well over 300. The last blood sugar taken 4 months ago was 164. Vision in the right eye is 20/50 and in the left eye is 5/200. There is present a bilateral exudative diabetic retinitis along with retinitis circinata. Only an occasional haemorrhage was seen. Both lenses after dilatation showed several diabetic "needles." Vision with correction was improved to 20/50 O.D. and 20/200 O.S.

CASE 12.—Mr. S.K., aged 65 years. Patient stated that he had diabetes for 21 years. He has been on a careful diet for several years but has never used insulin. Vision in the right eye is 20/40 and in the left eye is 20/50. The left pupil is irregular in shape and shows a marked atrophy of the inner circle of the iris. Under dilatation there are many diabetic needles in each lens. The eye grounds show an advanced exudative and haemorrhagic form of diabetic retinitis with particular involvement in the macular region. Vision is improved to 20/30 O.U. with a myopic correction.

CASE 13.—Mrs. D.G., aged 62 years. This patient had no knowledge of being diabetic. Vision is 20/40 in each eye. Under dilatation the patient was seen to have a few early diabetic needles in the periphery of each lens. The vision was improved to 20/25 in each eye. There were no eye ground changes suggesting diabetes and the patient stated she had had several negative urine examinations. She was referred for blood sugar studies which was reported as 110 mgm. per cent. Thereupon a modified sugar tolerance test was performed which was reported as being negative of early diabetic mellitus.



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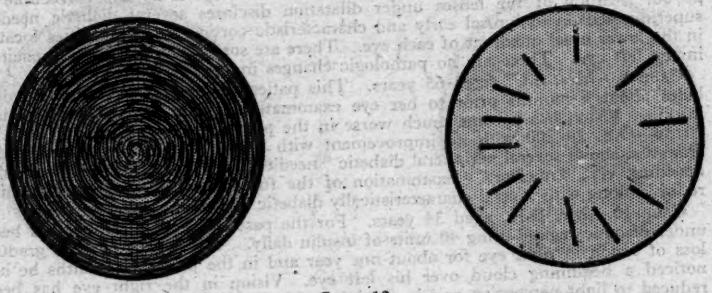

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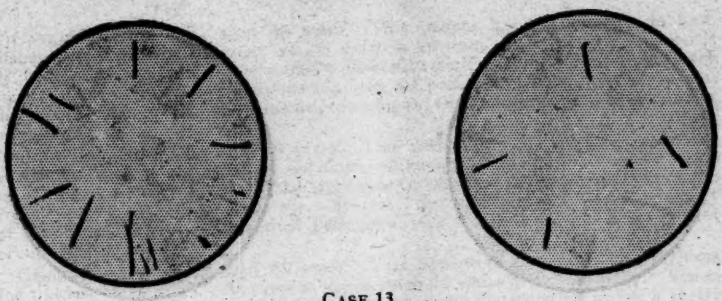

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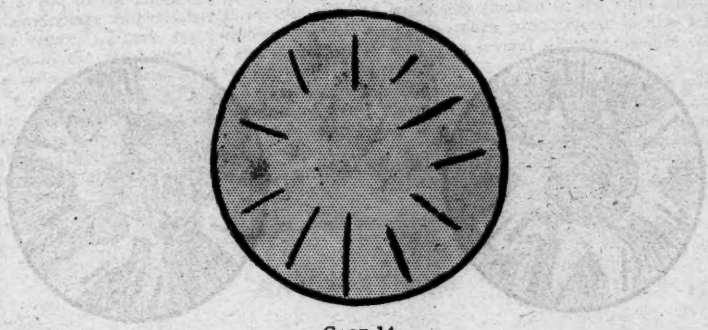

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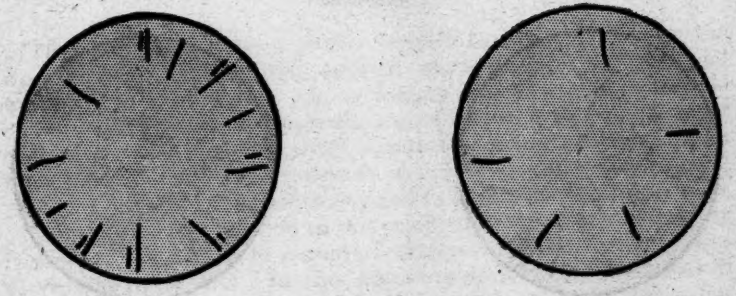

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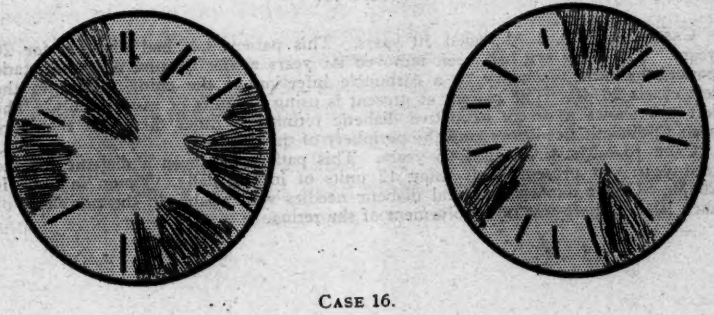

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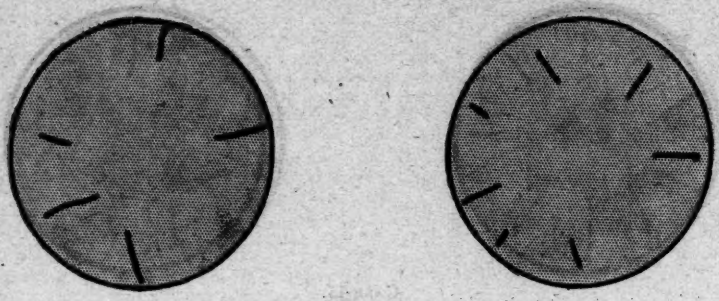

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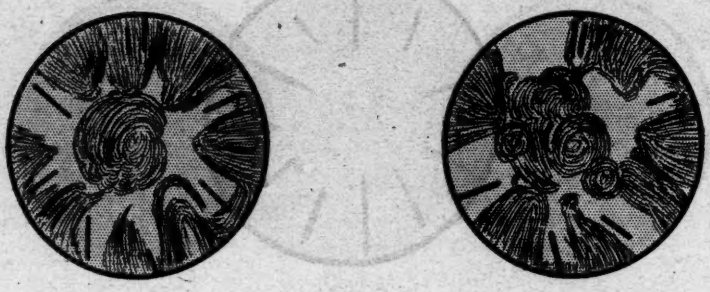

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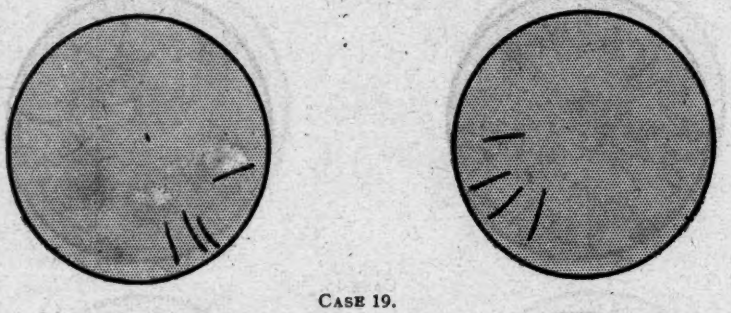

CASE 19.

CASE 14.—Mrs. L.M., aged 50 years. This patient has had diabetes for 20 years. The right eye had been removed six years earlier because of a metastatic panophthalmitis secondary to a carbuncle infection of the chin. Vision in the left eye is 20/40. The patient at present is using 35 units of insulin daily. The left eye shows a severe exudative diabetic retinitis. Under dilatation there are seen 12 diabetic needles around the periphery of the left lens.

CASE 15.—Mr. S.O., aged 45 years. This patient has been a diabetic for the past year. At present he is using 12 units of insulin daily. Vision in O.U. is 20/50. Under dilatation several diabetic needles were visible in the periphery of each lens. There was no involvement of the retina.

CASE 16.—Mrs. R.F., aged 60 years. This patient has been known to have diabetes for 22 years. Present insulin usage is 20 units each morning. Vision is 3/200 in each eye. There is a severe diabetic retinitis in each eye, the primary source of involvement being the macula. In the periphery of each lens are several diabetic needles which are superimposed upon the incipient cortical lenticular opacities.

CASE 17.—Mrs. F.B., aged 69 years. This patient has been diabetic for three years. At present she is using ten units of insulin each morning. Six months ago she had a stroke involving the right side of her face. Vision is 20/40 in the right eye and 20/50 in the left eye. Several "needles" are seen in the periphery of each lens. There is no retinal pathology. Only a slight visual improvement occurs with glasses.

CASE 18.—Mrs. K.F., aged 61 years. This patient is known to have diabetes for the last three years. At present she is using 10 units of insulin daily. Vision is 3/200 in the right eye and 2/200 in the left eye. Examination shows a severe haemorrhage and exudative diabetic retinitis, especially marked in the right macular region. There are posterior cortical cataracts more pronounced in the left than in the right eye. In the periphery of each lens several diabetic needles can be seen. There was little improvement with refraction.

CASE 19.—Mrs. S.K., aged 65 years. This patient has had diabetes for the past six months. No insulin has been given. Vision is 20/40 O.D. and 3/200 O.S. There are many haemorrhages throughout each fundus and extreme vascular pathology. Blood sugar at time of examination was 200 mgm. per cent. In the nasal periphery of each lens were a few characteristic diabetic needles.

ANNOTATIONS

Nursing

The shortage of nurses in this country to-day is hampering the work of hospitals. On this account wards have been closed and waiting lists of patients for admission are increasing. Special departments in general hospitals are embarassed by having to be content with reduced staff, often untrained, whilst more experienced nurses are allocated to the medical and surgical wards. The frequent changing of staff reduces efficiency and causes much wastage of time.

We think that a solution to this problem so far as ophthalmology is concerned would be to recruit nurses from such war time auxiliary services as the V.A.D. In this organization there are a number of intelligent young women who in 5 years of war acquired a fair measure of practical knowledge. Their work in the ophthalmic departments of the Army was admirable. The majority were quick to learn and became good with their hands.

It would meet the present needs if some way could be found of absorbing them into the nursing staffs of eye out-patient departments. Given a short course of intensive training many could pass the S.R.N. examination without the necessity of enduring the drudgery of three years of institutional life and the repetition of much that they have been doing for the past five years. If this

was not acceptable by the General Nursing Council then an ophthalmic certificate might be given and the auxiliary nurse earmarked for work in the eye department. The matter is one of administration. There is a large volume of work to be done, there is the need for eye-trained nurses and there are some young women with the necessary practical experience but without the academic qualification approved by the General Nursing Council. Some of the difficulties could be solved by careful combing of the Services.

Subordination or Insubordination

"I like subordination quoth my Uncle Toby," and it will be generally conceded that on the whole it is a good thing. But there are cases in which one can have too much of it. Medical practice, being so intimate and personal an affair between the doctor and his patient, does not lend itself in our view to over-much regulation. No two cases even of presbyopia are completely alike. Each may need a +1·0 D. sph., but no two have the same personality, nor are the interpupillary measurements always identical.

In the past there have been notable examples of medical men as disciplinarians. Abernethy, for instance, was brusque to the point of rudeness on many occasions. But he had a hold on his patients such as can have been given to few of his contemporaries. The doctor may advantageously be a martinet to his patients, but he does not relish having a super-martinet placed over him. To the credit of the profession, be it said, that in 99 cases out of a hundred the welfare of the patient is the over-riding fact in the doctor's mind. Rule of thumb practice has never commended itself to the majority of our profession. It would be a bold experiment for anybody to lay down rules for *e.g.*, what kind of operation should be performed for glaucoma. There are many varieties of glaucoma apart from acute and chronic cases; and what suits one does not necessarily suit another. One surgeon will pin his faith to iridectomy, another to trephining, and others to iridencleisis, wedge-shaped sclerotomies or sclerecto-iridectomy. And some cases of glaucoma are so exceedingly chronic that miotic treatment, at any rate for a time, is quite legitimate.

"Ilus," said Mr. Walter Shandy," circumscised the whole army one morning"—"Not without a court-martial! cried my uncle Toby." Here was an extreme instance of subordination. May we be pardoned if we put in a plea for no such drastic alterations in ophthalmological practice in the event of state medicine becoming an actual fact. There seems to have been some question as to the identity of Ilus, but, "let him be who he will, said my uncle Toby, I know not by what article of war he could justify it."

OPHTHALMIC CONDITIONS IN RETURNED PRISONERS OF WAR

We have received the following note from our Melbourne correspondent:—

The oculists of Sydney and Melbourne have been welcoming their P.O.W. colleagues back after 3½ years in Singapore. They are Dr, F. P. Chaffy of Sydney and Dr. Robin Orr of Melbourne. After conversations with Dr. Orr, a friend sent the following notes:—

Following the poor dietary given us by the I.J.A. in 1942 following capitulation, deficiency diseases became rife including diseases of the eye. A corneal lesion occurred first and this was closely followed by an outbreak of retrobulbar neuritis—very similar to tobacco amblyopia.

Gradually a measure of control over the trouble was obtained, some research work being attempted to elucidate the condition and its treatment. Such treatment as was available appeared to be satisfactory particularly if the cases were recognised in the earliest stages. For this purpose a clinic was established which at the busiest period was dealing with 30 new patients daily and about 140-150 reviews; so as to detect any deterioration in those complaining of failing vision. These were reviewed weekly or at most fortnightly, and if deterioration had set in, they were hospitalised in addition to such treatment (rice polishings, yeast and marmite in small quantity) as was available. Of the A.I.F. about 2,000 were affected (about 15,000 troops were originally in the camp), by retrobulbar neuritis, and about 800 by the corneal lesion. The corneal lesion cleared up and left no disability, but the retrobulbar neuritis in many cases has left a more or less disabling amblyopia. The lesion is typically bilateral. Many Dutch and English cases were also seen and treated.

It is hoped that some light may be thrown upon the pathology of the condition by Major Maynard who has brought home several complete brain sections with the optic tract from the eye to the occipital cortex, for sectioning and staining under proper conditions.

It was realised that the diseases were probably due to nutritional deficiencies, and the vitamin B complex was considered in this respect. When administered in the form of marmite, fair results were obtained. But it became necessary to supplement our stocks and so other substances had to be sought. Rice polishings were tried and were not satisfactory, in spite of good quality. Yeast was made and apparently gave some help. But from evidence obtained it seemed that riboflavin was one of the important deficiencies and this was known to be present in green leaves and grass.

Experiments were carried out with leaf extract and proved to be

satisfactory. Later on grass was substituted owing to difficulty in getting sufficient leaves. Soya beans were also used, when available and a preparation of "Tempi" made by them with a mould and then frying or baking them into a quite palatable cake. By these various means the diseases were apparently controlled and in some cases completely cured.

Memorandum on the Notification and Certification of the Blind, on Definitions of Blindness, and on Blind Pensions

The following memorandum on notification and certification of the Blind has been drawn up by the Institute of Ophthalmology, Royal Eye Hospital.

More perhaps than any other group of physically handicapped persons, the blind are ensured of public sympathy and help. In 1942 there were 75,306 registered blind persons in England and Wales—far too many for unco-ordinated benevolence. Indeed indiscriminate public sympathy is largely responsible for such a problem as that of blind mendicancy. The blind long to feel themselves useful citizens with duties as well as rights. It should be the aim of those interested in blind welfare not only to prevent physical want, but to lessen the sense of uselessness of which blind persons so frequently complain. There are already large numbers of happy and independent blind workers, self-respecting, often self-supporting, performing tasks useful to the community. The promotion of such an economic status should be the ideal of the welfare worker.

Chief among the obstacles to this is advanced age. In 1942 76 per cent. of the registered blind were over 50 years of age. Many had additional disabilities such as deafness, mental deficiency, or deformity and crippling. Blind workers have many expenses not incurred by sighted workers. Prospective employers tend to shun blind workers, lest they should have a greater liability to accident, though actuarial investigations prove this supposition to be incorrect. Finally, in pre-war years there existed the problem of National unemployment. If jobs are not available for the fit, disabled persons and the blind are not encouraged in the labour market. It is not surprising that about 80 per cent. of blind were in 1936 classed as unemployable. It is the task of statesmanship to reduce this figure.

1. *Statistics on blindness.*—Apart from the difficulty in the definition of blindness it seems that no final estimate of the number of blind in the country is possible. In the past information was

obtained from census returns, but these are generally regarded as unreliable as they were based on lay assessment. It appears that the most complete statistics on the number of blind have been obtained by the introduction of the Blind Persons Act with its statutory aid for the blind. As a result the number of blind people, who have been registered as blind on an expert examination, and data on the causes of blindness are now known to a fuller and far greater extent than in any other country. The increase in the number of registered blind from 26,336 shown by the 1911 census, and a similar figure shown in the first years of registration of the blind under the Blind Persons Act, to 75,306 in 1942, emphasises the margin of error in the older statistics. The collection of statistics is of course not undertaken by Government Authorities for scientific purposes; unless such statistics have a practical implication—such as leading to action in the case of infectious disease or industrial accidents, they are not sought. No convincing case can be put to the central authorities for the collection of full statistics on blindness, for the blind who need relief are covered by the Blind Persons Act. Those who do not fall in this category are essentially personal problems; and it is not a practice of governments to collect data on such matters.

None the less it would be of considerable value to have full statistical data on the blind population, and it is a matter of some importance to know how many people are blind in one eye. There is room for unofficial enquiries in this direction.

2. *Definition of blindness.*—The dictionary definition of blindness as implying the absence of sight is logical but obsolete. In most countries persons retaining some degree of vision are included by the State or voluntary agencies in the blind category. Logically the State should base its categories on visual criteria; but in England and Wales an ophthalmologist is asked to certify an applicant as blind on an industrial ground as one who is "so blind as to be unable to perform any work for which eyesight is essential," or in the case of children "too blind to be able to read the ordinary school books used by children." Hence the examining surgeon is presumed by the law to possess knowledge of both industrial and of educational criteria, much as he is presumed to know the conditions of grading for military duty, or to determine various degrees of incapacity for purposes of pension.

In these matters the legal view of a doctor's knowledge is too complimentary.

The definition of blindness has recently been discussed by a Sub-Committee of the Council of British Ophthalmologists in conjunction with representatives of the Institute. Apart from recommendations of immediate practicability made by them the following observations are relevant:—

(1) There are no substantial studies on the standard of vision necessary in sighted occupations. The one significant contribution has come from Dr. Albert Snell who found that some individuals can continue with sighted jobs with vision as low 5/200 (or approximately 2/60).

Granted that changes in industry are constantly taking place, altering the requisite visual standards, we are in the anomalous position that no adequate estimates have been made of the minimum visual standards for any of the ordinary sighted occupations. The 3/60 standard which is used in practice is wholly arbitrary and without scientific authority. At the beginning of the century and in most international statistics 1/60 was regarded as the standard qualifying for blindness. In the United States 20/200 (or approximately 6/60) is the official numerical definition; but in certain States other standards are used—in Pennsylvania, for instance, the standard is 10/100 (or approximately 3/30).

Tentative evidence that the 3/60 standard is not adequate

Generally speaking relatively few applications are made for blind pension unless there is at any rate a colourable possibility of success. It is found that quite an appreciable proportion of those actually certified have over 3/60 vision, as the following figures show:—

	Total certified 1935-43		*Certified with vision over* 3/60	
	Men	Women	Men	Women
L.C.C.	2,901	4,057	402	398
Middlesex	1,054	1,510	153	176

In Glasgow the number of applicants for Blind Pension during 1929-35 was 5,140; 37·4 per cent. were rejected. In London 1,995 were rejected out of a total of 10,971 during 1935-43 (or approximately 18.9 per cent.). For the same period there were rejected in the Middlesex County Council area 689 out of 3,280 (or approximately 21 per cent.).

Rejected cases are usually borderline, so that a considerable number of people with difficulty in carrying on work are found not blind by the official definition.

In Pennsylvania on the 20/200 standard there were 20,000 blind. When the standard was altered to 10/100 this became reduced to about 12,000.

Although the 3/60 standard is accepted for the present emergency period, it is suggested that the Government be urged to initiate an adequate investigation over a cross-section of various industries to determine:

1. In which industries full visual capacity is not essential.

2. In which industries declining visual capacity affects efficiency.

3. In which industries continuation of employment becomes impossible when there is gross decline in vision.

4. At what level of visual disability sighted occupation becomes a practical impossibility.

5. A careful investigation conjointly with experienced educationalists into what standards of vision are really necessary to cover the immediate visual requirements for learning.

No dual standard for educational and industrial blindness has been necessary in the United States, where 20/200 is operative for both purposes. Any comprehensive scheme must take note of the fact that in addition to industrial blindness in general there is vocational blindness, in so far as an individual may no longer be able to continue the work for which he has been trained and is too old to be trained to a new occupation.

3. *Blind pensions.*—In 1942 the total number of registered blind in England and Wales was 75,306. It may be presumed that most of these blind persons had been registered in the course of applications for pecuniary assistance. Few ophthalmic surgeons go to the trouble of arranging for blind certification unless there is some financial advantage to the patient. The number of registered blind, therefore, does not represent the full number of registrable persons.

Difficulties also arise sometimes where children educated at schools for the blind under the definition of " Blindness " adopted by the Education Act, 1921, find on leaving school that they are not registrable as blind persons under the Blind Persons Act, 1920. They have to compete in the labour market as sighted persons, with a less complete education than the average sighted child of school-leaving age. If they are not aided to a vocational training such children inevitably tend to drift into the ranks of unskilled workers.

The population of England and Wales is tending toward a larger proportion of the higher age groups. Since blind persons are more common in the older age groups, an increase in the average age of the population is likely to lead to a proportionate increase in the incidence of blindness.

Another consideration is the national unemployment problem. If unemployment is rife, it may pay to remove the blind largely from the labour market. If labour is short, any labour the blind may perform should be nationally welcomed. From the blind person's own viewpoint, the independence attainable from paid employment is something of the highest importance.

These considerations lead to the following suggestions:—

(*a*) *Blind pensions over the age for Old Age Pensions in the*

sighted.—Here the standard for certification should be a visual not an industrial one.

Certification should carry with it a pension higher than that provided for the sighted, as a blind person has expenses from which a sighted person is free. At present many old people are not registered as blind because they are receiving Old Age Pensions already.

This type of pension should be given irrespective of whether the patient is working. If he is encouraged to work, so much the better for himself and the national welfare.

(*b*) *Blind persons of working age.*—The present policy is to give Old Age Pensions at the reduced age of 40 years to blind persons. This policy is a reflection of the period when unemployment was rife; and this is not attuned to the present conditions of labour shortage. The Old Age Pensions Act, 1936, lays down substantial reductions of pension, even for quite minor earnings. Yet it costs a blind person more to live than a sighted individual. It is therefore suggested that:

1. A general pension be granted for this age group on purely visual standards as in group (*a*). This should be considered a "handicap allowance" to supplement the working wage of this group; but should be smaller than the Old Age Pension granted to group (*a*).

(2). Those certified blind and precluded by disability from working, be granted full blind pensions (as group (*a*)). The addition should be on medical certification which should be reviewed from time to time.

(*c*) *Educationally blind persons reaching working age.*—These cases should be reviewed by ophthalmic surgeons on reaching working age. A large proportion will be found to be eligible for blind registration under the group (*b*) scheme. Some will not be eligible for registration, but generous grants should be made to assist them in the period when they are trainees in their future occupation. This would help those with ability to escape from blind-alley and unskilled work.

(*d*) *Blind children of school age and under.*—Generous grants should be made to those parents of such children in need of pecuniary assistance for such special purposes as travel to special schools, etc.

(*e*) *Anomalies and appeal tribunal.*—Under any system certain hard cases will fall outside the net. In the present system much hardship is caused by ignoring the patient's previous occupation in estimating visual requirements. Circular 1352 is based on a visual standard which emphasises the "ANY" in the official standard of "too blind to perform ANY work for which eyesight is essential." An elderly tailor, chartered accountant or oph-

thalmic surgeon with lowered visual acuity would be incapacitated at a visual level far higher than that postulated by Circular 1353. It is impossible to include such cases in any general scheme, yet real hardship is often involved. An elderly clerical worker cannot readily undertake rough manual labour.

Such persons are also precluded in sharing in the benefits of the fairly considerable private charitable funds now available for the "indigent blind." It appears that under present conditions a certain amount of such charitable money is sterilised, as those in receipt of blind pensions are not legally considered "indigent." A survey might well be made of such charitable funds, and if the aggregate is sufficient to be significant, the money might be made available to visually handicapped persons by a short Enabling Act. The matter is one for the Charity Commissioners and their legal advisers in the first instance. However this may be, it is unlikely that these funds will be enough without State supplement.

The Committee consider such persons should have access to some appeal tribunal, which should preferably contain lay representation as well as medical. This tribunal should be open to all persons who considered themselves wrongfully refused blind registration and its benefits. Such persons frequently travel from one certifying surgeon to another, wasting time and possibly incurring expense.

Funds should be made available for granting special handicap allowance.

ABSTRACTS

I.—PATHOLOGY

(1) **Julianelle, L. A. and James, W. M. (Saint Louis).—Molluscum contagiosum of the eye, its clinical course and transmissibility, and the cultivability of the virus.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 565, 1943.

(1) **Julianelle** and **James** describe 5 cases of molluscum contagiosum. One of these had suffered for 6 months from severe follicular conjunctivitis, corneal epithelial infiltrations and erosions and pannus. In this case and in another with milder follicular conjunctivitis the molluscum contagiosum lesion was on the lid margin. In a third case where the lid margin was affected mild conjunctivitis was present. In these three the cornea was involved. In the two remaining cases, the lesion was on the lower lid in one and was generalized elsewhere on the body in the other. In both cases conjunctivitis was mild and there was no corneal complication.

It is probable that the infection originates in the sebaceous glands. When the lesion was on the lid margin the patient sought medical attention within 2 to 4 weeks of the onset of the disease. The epithelial cells containing the inclusions are immense and have a characteristic histological appearance.

Treatment consists of resection of the lesion and mild irrigation of the conjunctival sac. Experimental work showed that the incubation period ranged from 14 days to 6 months. The disease is not transmissible to monkeys, rabbits or white mice. Implantation in the hen egg was followed in 2 out of 4 experiments by infection of the chorio-allantoic membrane, multiplication of the virus and the appearance of typical inclusion bodies. Molluscum contagiosum differs from most virus diseases in that the degree of infectivity is low.

H. B. STALLARD.

(2) **Donahue, H. C. (Boston). — Metastatic panophthalmitis followed by retinal separation and recovery.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 283, 1943.

(2) **Donahue** reports the case of a man, aged 52 years, who developed metastatic panophthalmitis in the right eye seven days after trans-urethral prostatectomy. The prostate was infiltrated with leucocytes.

Sulphadiazine was administered in doses sufficient to keep the blood concentration at 20 mg. per cent. from the third to the tenth day of observation. From the eighth day the acute inflammatory process gradually receded, and by the seventeenth day the eye looked normal.

An extensive retinal detachment involving the lower quadrants and the macula was operated on successfully, despite the absence of a tear. Ultimately vision was 20/70 with glasses, and there was a 15 degree constriction in the upper nasal field.

H. B. STALLARD.

(3) **Goldberg, S. (Pittsburgh, Pennsylvania).—Bacillus Pyocyaneus infection.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 78, 1943.

(3) **Goldberg** describes the case of a negro, aged 19 years, with bilateral conjunctivitis and corneal ulceration caused by bacillus pyocyaneus. The patient received sulphathiazole 4 gms. daily. Slight improvement was noted after 5 days; on the 9th day the corneal ulcers had healed. On the 12th day sulphathiazole therapy was discontinued on account of a fall in the leucocyte count to 3,200. Five weeks from the onset of the disease vision had recovered to 20/20 in each eye.

H. B. STALLARD.

(4) **Ellis, O. H. (Los Angeles).—Free-floating cyst of the anterior chamber.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 859, 1943.

(4) **Ellis** states that only 21 cases of free-floating cysts in the anterior chamber have been reported. His case, a man aged 22 years, had noticed a cyst 3 mm. in diameter in the anterior chamber of his right eye for five years. This was symptomless.

The author discusses the origin of these cysts from (1) the pars iridica retinae (2) remnants of pupillary membrane and (3) detached flocculi at the pupil margin.

H. B. STALLARD.

(5) **Payne, B. F. (New York).—The diagnosis of ocular syphilis.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 266, 1943.

(5) **Payne** stresses the importance of early diagnosis of syphilis and states that a "cure" is possible in 98 to 100 per cent. of cases if the diagnosis is made within 14 days of inoculation, but approximately only 80 per cent. are cured if treatment is delayed until the Wassermann reaction is positive. He emphasizes the importance of repeated blood and serological tests when syphilis is suspected on chemical grounds, but the results of these tests are doubtful and negative.

The author describes briefly the ocular lesions due to syphilis. He points out the importance of repeated visual field examinations during tryparsaminide therapy.

H. B. STALLARD.

II.—THERAPEUTICS AND OPERATIONS

(1) **Scheineson, L. M. (Cincinnati, Ohio).—Ophthalmic ointments.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 171, 1943.

(1) **Scheineson** discusses pharmaceutical vehicles suitable for ophthalmic drugs. He favours ointment, and in particular, bases such as cholesterolated petrolatum (aquaphor) and other water-absorbent petrolatum bases such as hydrosorb. These are miscible with water, their consistency is semi-liquid or liquid emulsion and they will incorporate either water-soluble or water-insoluble drugs in a cream-like ointment. For ophthalmic use water up to a 40 per cent. concentration can be incorporated with this base.

Careful attention is paid to the pH and the active ingredients are dissolved in their buffered solution and this is incorporated in the cholesterol base. The optimum reaction of atropine, scopolamine and eserine is pH 7·5.

The author gives a description of his technique for preparing ophthalmic ointments and for adding such therapeutic adjuvants as

scarlet red, vitamin A, liver-oil and local anaesthetics. He emphasizes the necessity for keeping separate utensils for the mydriatic cycloplegic group of drugs, the porosity of the utensils harbouring traces of these alkaloids. No preservatives are used. Manipulations of the ointment are done with sterile wooden tongue depressors. Aseptic technique is essential. The ointment is set up in collapsible tubes.

H. B. STALLARD.

(2) **Gallardo, E. and Thompson, R. (New York).—Sulfonamide content of aqueous humor following conjunctival application of drug powders.** *Amer. Jl. Ophthal.*, Vol. XXV, p. 1210, 1942.

(2) **Gallardo and Thompson** produced acute ocular inflammation by mustard oil in the conjunctival sac and by streptococcal infection of the anterior chamber. This increased the passage of sulphanilamide into the aqueous fluid. They comment that the increase may have been due entirely to injury of the corneal epithelium, since intra-ocular inflammation by the intravenous injection of killed typhoid bacilli definitely diminished passage of the drug.

Of the drugs tested by local application, the higher levels in the aqueous humour were obtained with sulphanilamide.

H. B. STALLARD.

(3) **Sallmann, L. von (New York).—Sulfadiazine iontophoresis in pyocyaneus infection of rabbit cornea.** *Amer. Jl. Ophthal.*,

(3) **Sallmann** found that sulphadiazine iontophoresis was successful in checking the progress of keratitis in 4 rabbits out of a series of 7 when applied 8 to 18 hours after the rabbits' eyes had been inoculated. In the remainder progress was controlled only for one day and a turn for the worse occurred during the night between the second and third days. The iontophoretic administration of the sodium salts of sulphapyridine and sulphacetamide achieved higher concentrations in the anterior segment of the eye than did other clinical methods. It was found that sulphadiazine enters the eye in greater amounts than the other sulpha-drugs studied. It remains in the anterior parts of the eye for four hours in a bacteriostatic concentration. In the presence of an ulcer or an abrasion of the cornea still greater amounts are found.

Sulphadiazine iontophoresis applied to pyocyaneus infection of the rabbit cornea gave better results than those obtained by other local methods and with general treatment. The percentage of good results was raised by combining iontophoresis with oral administration of sulphadiazine when treatment was begun 18 hours after pyocyaneus inoculation. Oral administration alone did not prevent

the extensive ulceration of the cornea. The most favourable treatment of pyocyaneus keratitis in rabbits 24 to 30 hours after inoculation was a combination of sodium sulphadiazine iontophoresis and sulphadiazine powder given locally and orally.

These experimental findings were confirmed by the results with the combined treatment on two patients suffering from advanced pyocyaneus corneal ulcers.

H. B. STALLARD.

(4) **Krantz, D. (Brooklyn, New York).—Heparin in the treatment of thrombosis of the central retinal vein or of its branches.** *Amer. Jl. Ophthal.*, Vol. XXV, p. 1368, 1942.

(4) **Krantz** describes two cases of thrombosis of the central retinal vein in which rapid and complete cures followed intravenous injection of heparin and large doses of citric acid in the form of lemons. In one case vision improved from hand movements to 20/30 in 42 days. Single doses of heparin, 100 mg. and 200 mg. were given. In the other case the thrombosis affected the superior temporal branch. Three intravenous injections of heparin were given. In 23 days vision was 20/20.

H. B. STALLARD.

(5) **Engel, S. (San Francisco).—Reflection on the clinical use of atropine.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 297, 1943.

(5) **Engel** discusses the danger of using atropine in doses such as 1 per cent., particularly in cases of iridocyclitis associated with secondary glaucoma. He describes the effects of substitutes such as cocaine 5 per cent. with adrenalin 1/1000, euphthalmine 1 per cent. and homatropine 1 or 2 per cent. He considers that "atropine in such small concentrations as 1 : 2,000 and 1 : 500 used continuously gives better results than the application of stronger amounts." Two cases which illustrate these points are discussed.

H. B. STALLARD.

(6) **Guyton, J. S. (Baltimore, Maryland) and MacGovern, F. H. (Danville, Virginia).—Diathermy coagulation in the treatment in angiomatosis retinae, and of juvenile Coats' disease.**

(6) **Guyton** and **McGovern** describe a case of bilateral angiomatosis retinae in a girl, aged 13 years. X-ray therapy was valueless, the fundus lesions increasing during and after treatment. A single lesion in the upper nasal quadrant of the right eye was treated by diathermy. Sixteen Walker pins were inserted through the sclera

into and just surrounding the neoplasm. The lesion was obliterated and the feeding vessels returned to their normal calibre.

The left eye was more severely affected and although three operations obliterated the angiomatous masses retinal detachment remained and there was no hope of restoring any useful vision.

The second case was one of bilateral exudative retinitis (Coats' disease). In the left eye the retina was completely detached. During a subsequent attack of measles this eye developed glaucoma, ultimately shrank and was enucleated. In the right eye there was a lesion on the temporal side near the periphery. X-ray therapy was valueless. Diathermy was applied to the affected site through 16 Walker pins. The lesion contracted down to a white scar and 8 weeks after operation vision was 20/20−3.

In both these cases post-operative reaction after diathermy was considerable. The authors comment that this might have been less had fewer punctures been made and that light surface coagulation may be all that is necessary. Retinal and sub-retinal exudates remote from the lesion became absorbed after the primary angioma was eradicated.

H. B. STALLARD.

(7) **Kirby, D. B. (New York).—Electro-surgical excision of pterygium.** *Amer. Jl. Ophthal.*, Vol. XXVI, p. 301, 1943.

(7) Kirby's technique for electro-surgical excision of pterygium amounts to a division of the base of the pterygium by a surgical diathermy needle which cuts vertically across the vessels entering the pterygium. Access to this is gained after the operation for excision of the pterygium has been almost completed.

H. B. STALLARD.

BOOK NOTICE

Die Erblichkeit Angeborener Totaler Farbenblindheit mit Lichtscheu. By G. F. GÖTHLIN, Upsala. *Acta Ophthal.*, Vol. XIX, pp. 202-218. Copenhagen. 1941.

This paper includes an analysis from the genetic standpoint of 76 recorded cases of total colour-blindness with photophobia. The author concludes that the condition has a genetic source, is not sex-linked and is due to a recessing gene which does not manifest in heterozygotes; he further concludes that total colour-blindness has no relationship to the much more common defect of dichromatism.

None of these conclusions have been in doubt for many years

but it is of value to have all the available facts of so interesting and rare an affection collected up to date and analysed. Moreover, those of us who have not had leisure or ready accessibility to recent literature since 1939 will feel indebted to the author for calling attention to the extremely interesting history published by Holm and Lodberg in 1940 and to that of Tanaka published in 1938, showing the occurrence of total colour-blindness in more than one generation and, in the former case, in several related sibships.

CORRESPONDENCE

EXPERIMENTAL CORNEAL LESIONS

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

DEAR SIRS,—In a paper in the *Brit. Jl. Ophthal.* of March, 1945, Sorsby and his co-workers stated that they were unable to produce experimental corneal lesions in the rabbit's eye with a number of organisms. At the most, localised opacities were produced which healed in a few days and were, they believe, essentially a pressure necrosis reaction. The intracorneal injection technique used was similar to that used by J. M. Robson and G. I. Scott (*Lancet*, I, p. 100, 1943) to study the effects of chemotherapeutic agents, and some of the strains used were actually provided by these authors.

Professor Sorsby kindly sent the manuscript of his paper to one of us before publication, and was invited to visit Edinburgh in order to see the technique and experimental lesions with the idea of elucidating the reasons for the discrepancy between his results and those described by Robson and Scott. He was, unfortunately, unable to come.

In a recent review in the Journal (October, 1945) on the use of penicillin in ophthalmology he stated: "There is, as yet, no valid experimental evidence that local penicillin therapy is effective in infections of the outer eye, for the work of Robson and Scott is based on an unsatisfactory experimental lesion. The same criticism probably applies to the report by Leopold, Holmes and La Motte, who worked with a bacillus allied to the Friedlander bacillus. Until there is available an experimental lesion of the cornea that does not heal spontaneously, such studies are of limited significance."

The lesions produced in Edinburgh were seen by a number of observers well versed in ophthalmological and experimental science, and they have also been produced without difficulty by Dr. Brownlee working at the Wellcome Physiological Research Laboratories.

In order that the lesion should be satisfactory for the investigation of methods of therapy it should be sufficiently severe and lasting to demonstrate clearly the effect of any treatment. The lesions which were produced in Edinburgh (and which Sorsby and his co-workers did not obtain) were satisfactory because (1) they caused severe destructive changes in the cornea, leading in some cases to actual perforation and (2) the effect of successful treatment lessened both the severity and duration of the lesions. This was especially clearly shown by the results obtained with local penicillin therapy.

It is worth adding that these experimental lesions were, as a rule much more severe than those commonly encountered in the human cornea.

It is regrettable that, without making an attempt to probe the reasons for the divergent results, Professor Sorsby should have indulged in uninformed criticism.

We are, Yours faithfully,

I. C. FRASER,
J. M. ROBSON,
A. A. B. SCOTT,
G. I. SCOTT.

DEPARTMENT OF PHARMACOLOGY,
UNIVERSITY OF EDINBURGH.

October 25, 1945.

NOTES

Professor A. W. Mulock Hower

OUR Melbourne correspondent informs us that Professor Mulock Hower has arrived in Melbourne from Batavia. He, with other members of the Medical Faculty, was interned after the capture of Batavia on March 15, 1942, and he remained in prison for 2 years. He was allowed to do a little ophthalmological work between March and August, 1945, and in October, 1945, he was allowed to return to Batavia, where, after separation for three years, he rejoined his wife and daughter who had been interned in the infamous Tjideng camp.

* * * *

Ophthalmological Society of Australia.

THE next meeting of the Ophthalmological Society of Australia will be held in Melbourne in October, 1946.

DEC 2 7 1945

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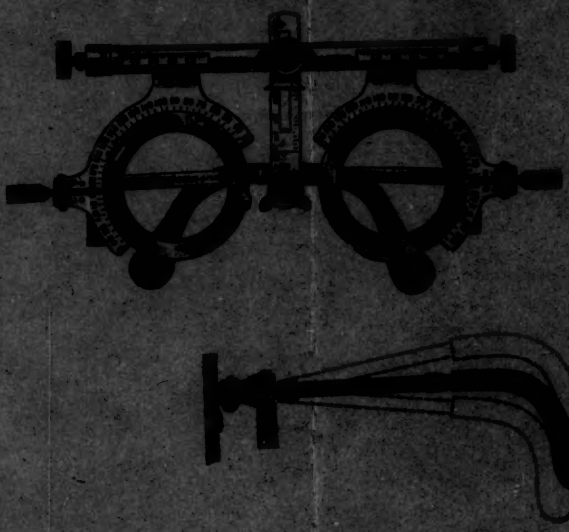

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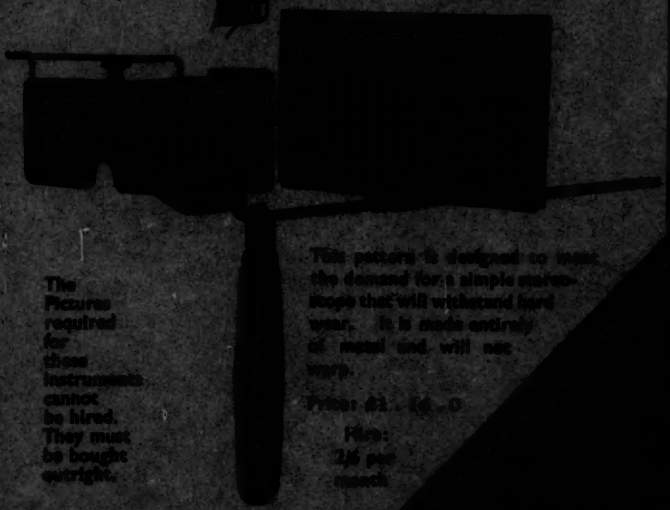

The Pictures required for these instruments cannot be hired. They must be bought outright.

This pattern is designed to meet the demand for a simple stereoscope that will withstand hard wear. It is made entirely of metal and will not warp.

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